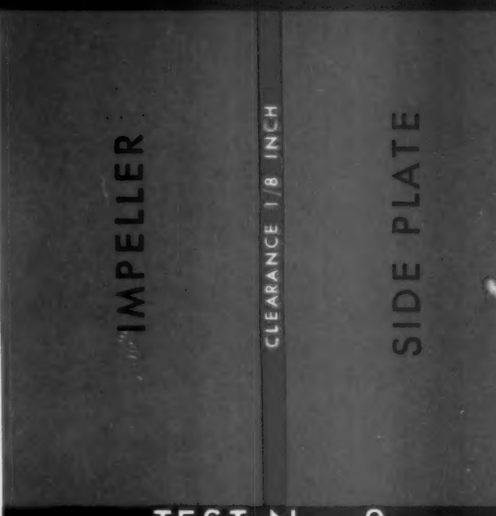
PIT AND QUARRY

NOVEMBER, 1938

New Paraná Plant of Argentine Portland Cement Co. . . . Analysis of the Breerwood Process . . . Lining the Rotary Lime Kiln . . . Cost-Cutting Versus Price-Cutting

TEST No. 1
CONVENTIONAL PUMP

CLEARANCE . . . . . **1/16 INCH**
Between Impeller & Pump Side Plate
HEAD . . . . . **160 FEET**
Developed for Test
PRODUCTION . . . **3500 G.P.M.**
Capacity under above conditions
. . . **NOTE** . . .
HYDROSEAL would Increase this Production **7%**
(See Test No. 4)



TEST No. 2
CONVENTIONAL PUMP

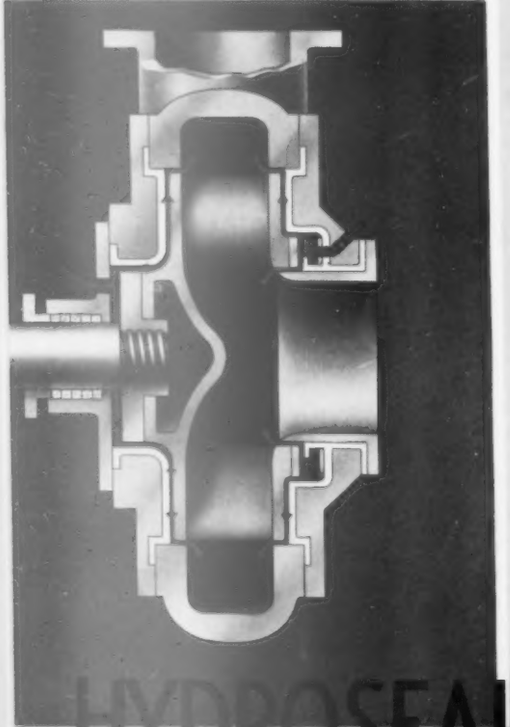
CLEARANCE . . . . . **1/8 INCH**
Between Impeller & Pump Side Plate
HEAD . . . . . **160 FEET**
Developed for Test
PRODUCTION . . . **3250 G.P.M.**
Capacity under above conditions
. . . **NOTE** . . .
HYDROSEAL would Increase this Production . . . **16%**
(See Test No. 4)

TEST No. 3
CONVENTIONAL PUMP

CLEARANCE . . . . . **3/16 INCH**
Between Impeller & Pump Side Plate
HEAD . . . . . **160 FEET**
Developed for Test
PRODUCTION . . . **3000 G.P.M.**
Capacity under above conditions
. . . **NOTE** . . .
HYDROSEAL would Increase this Production . . . **25%**
(See Test No. 4)

TEST No. 4
HYDROSEAL PUMP

CLEARANCE . . HYDROSEALED
Between Impeller & Pump Side Plates as indicated by arrows in diagram below
HEAD . . . . . **160 FEET**
Developed for Test
PRODUCTION . . . **3750 G.P.M.**
Capacity under above conditions
. . . **PROOF** . . .
of increased capacity is shown by the fact that the Hydroseal Pump gives greater production no matter how small the clearance between the Impeller and Side Plates of the Conventional Dredge Pump.



Proof that Hydrosealing Increases Production

Two 12″ pumps were tested, both being identical in every way except that one had the clearance between the impeller and pump side plates hydrosealed with clear water, thus preventing the clearance from wearing larger, due to abrasion. The other pump, similar to those of conventional design (without hydrosealing) was set with clearances between the impeller and pump side plate of $\frac{1}{16}$″, $\frac{1}{8}$″ and $\frac{3}{16}$″. These clearances compare with actual conditions found in conventional dredge pumps, for as the pump operates, abrasive wear continually enlarges these clearances. . . . Results of these tests prove that after the clearance between the impeller and side plate of the conventional pump wears to $\frac{3}{16}$″ (generally considered small), the production is 25% less than a Hydroseal Pump. The tests also prove that even when a conventional pump is new, its best performance is not as good as a Hydroseal Pump. These percentages of better production with the Hydroseal Pump increase as the pump suction diameter decreases, thus if you operate pumps smaller than 12″, the benefits you could obtain with a Hydroseal Pump would be even greater. If you will write us describing your conditions and the impeller clearances of your pumps, we will gladly tell you what a Hydroseal Pump will save you. If you wish, one of our engineers will call, or if you prefer we will send our complete catalog No. 937. Address the nearest office listed below.

HYDROSEAL MAXIMIX RUBBER PROTECTED DREDGE PUMPS

HYDROSEAL AND MAXIMIX DESIGNS ARE COVERED BY PATENTS AND APPLICATIONS IN THE MAJOR MINING CENTERS OF THE WORLD AND CAN BE PURCHASED ONLY THROUGH THESE COMPANIES
U. S. A.: THE ALLEN-SHERMAN-HOFF CO., 223 S. 15th St., Philadelphia, Pa., Offices or Representatives in most Principal Cities **AUSTRALIA:** CROSSLE & DUFF PTY., LTD., 360 Collins Street, Melbourne

Engineered for Low-Cost Results when Designed by LINK-BELT

Left: Airplane view of McGrath Sand and Gravel Co's., Chillicothe, Ill. plant. One of ten Link-Belt plants designed and built for this company.

McGrath's original Chillicothe, Ill. plant. Designed and built by Link-Belt in 1914. Remodeled and electrified in 1922 and replaced in 1933 with the modern steel and concrete plant, shown to the left.

● Link-Belt has not only brought to a high state of perfection the design of the various units entering into a complete preparation plant, but has paid particular attention to the proper application of these units. Plant layout is all-important. Misapplication of equipment results in inefficiency, high operating costs, and an unsatisfactory product.

Let Link-Belt bring its engineering skill and experience to bear on your problem. The sole objective is to help you turn out a clean, uniform product at the lowest cost. Link-Belt manufactures in its own shops a complete line of all types of screens, washers, conveyors, elevators, etc., and is, therefore, free to recommend the type and method that will fit the particular conditions best. Send for Book No. 1240.

Link-Belt Company, 300 W. Pershing Road, Chicago; Indianapolis, San Francisco, Philadelphia, Atlanta, Toronto. Offices in Principal Cities.

7561

LINK-BELT

Preparation - - Conveying - -

Power Transmitting Equipment

PIT AND QUARRY, November, 1938. Vol. 31, No. 5. Published monthly by the Complete Service Publishing Company, 538 South Clark Street, Chicago, Ill. Subscription price $1 for 1 year in the U. S. and possessions, Canada, Central and South America; elsewhere $1 additional for each year. Single copies 20 cents. Entered as second-class matter February 28, 1932, at the Post Office at Chicago, Ill., under the act of March 3, 1897.

HAVE YOU *Investigated?* The Brooks LOAD LUGGER

PATENTED & PATENTS PENDING

CUTS HAULING AND DUMPING COSTS WHEREVER LOADING IS DONE BY HAND

FOR MANY TYPES of SERVICE

One simple demonstration is sufficient to convince any prospect that the Brooks "Load-Lugger" is America's most effective machine for cutting hauling and dumping costs of any material loaded by hand. The "Load-Luggers" adaptability to varied types of service is unlimited. For quarries . . . sewerage and road construction . . . excavating . . . concrete aggregate hauling . . . W.P.A. projects . . . snow removal and many other types of service, the Load-Lugger increases production, yet reduces equipment and operating costs.

One Brooks "Load-Lugger" and 5 to 10 Load-Lugger buckets may replace an equal number of trucks. It is ONE MAN operated from driver's seat . . . dumps automatically . . . requires no cables, sheaves, high pressure hydraulic hose, or tricky "gadgets" . . . all contributing factors to the "Load-Lugger's" economy and efficiency. Because of its special design, the Brooks "Load-Lugger" requires no counterweight on front of trucks, completely eliminating dead weight. The entire load is carried directly on the truck chassis. It can be installed on any truck chassis in a few hours. Built in 4 capacities. Write or wire now for fully illustrated literature. Demonstrations arranged in most sections.

BROOKS EQUIPMENT & MFG. CO.
63 DAVENPORT ROAD · KNOXVILLE, TENN.

(Top of Page) Dirt fill—handling dirt at .20 less per ton over other methods. (Top Above) Handling over 600 tons of rock per 8 hour day with 2 Load-Luggers and W.P.A. labor. (Circle) Passenger Transport Body Attachment accommodates 15 men. (Bottom) Fast removal of snow from city streets.

NOW GMC DIESEL TRUCKS

3-4-6-CYLINDER .. REVOLUTIONARY 2-CYCLE

All-New GMC Trucks with *All-New* Engines for 1939

GMC alone among trucks offers a *full* line of Diesels—12 new models! The new 2-cycle Diesel principle employed by GMC reduces engine size and weight—giving more power for weight—and makes engine operation extremely flexible and smooth. The GMC Diesel fuel injection system meters the fuel, injects and atomizes it perfectly, a separate unit injector feeding directly at each cylinder. Easy to understand, easy to service, the new GMC Diesels are also extremely economical.

All-new GMC valve-in-head gasoline engines in all-new GMC chassis—including every needed size for practical purposes—the most extensive line of high-powered trucks in 40 years' commercial vehicle history!

Our own YMAC Time Payment Plan assures you of lowest available rates

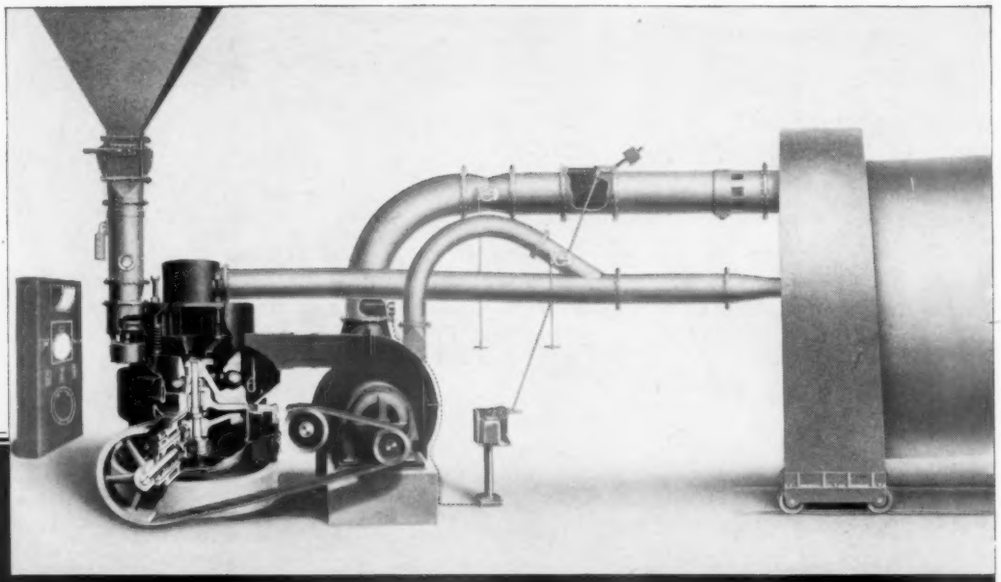
EXCLUSIVE GMC DIESEL

FEATURES

- ★ **2-cycle principle—smaller, lighter, smoother power plants!**
- ★ **Independent fuel injector located at each cylinder!**
- ★ **Flexibility equal to gas engine performance—lugging ability unequaled in any engine!**
- ★ **Longer, useful life assured by perfect engine balance, by less piston travel, by over-size bearings and all wearing parts, and by efficient cooling.**

THE TRUCK OF VALUE GMC

TRUCKS ★ TRAILERS ★ DIESELS



B&W TYPE E PULVERIZER

brings these *New Advantages*

30% Less Power

Operation Simplified

—The only direct firing system with thermostatic control and automatic feeder regulation.

Low Maintenance

—Improved material flow, plus ball bearing steel in grinding balls, provide long life for balls and grinding rings.

B&W Type E Pulverizer—the outcome of the successful application of the ball-bearing grinding principle to well over 500 B&W Pulverizers since 1929. Its construction differs from that of Type B Pulverizers of comparable size mainly in the use of bottom drive and rotating bottom ring.

B&W Type E Pulverizer delivers full capacity throughout life of grinding elements. Tramp iron and pyrites are rejected in the mill.

THE BABCOCK & WILCOX COMPANY
85 LIBERTY STREET NEW YORK, N. Y.

BABCOCK & WILCOX

C-22

Control of Composition at Parana

(Above) The minerals separation equipment of the Parana, Argentina plant. (Below) Ten Fagergren flotation cells recover the lime and eliminate excess silica and alumina.

We design, equip and supervise the erection of complete cement raw material processing plants. Our laboratory and pilot plant are fully equipped to make complete investigations of your materials, on either an experimental or semi-commercial scale. Five cement mills are now operating under our process, and the preliminary work has been completed for several others. Write us for recommendations.

The new plant of the Argentine subsidiary of the Lone Star Cement Corporation is producing cement of the highest quality and uniformity exclusively from low-grade rock available at the plant site. Compositions for all known types of portland cement can be derived from the natural materials, without blending or correction with materials from outside sources. The flow of raw materials through the plant was designed to take full advantage of the possibilities of the Breerwood Process appropriate to these materials. Grinding, classification, froth flotation and thickening were co-ordinated to produce kiln feed of the desired composition and the high fineness, essential for the production of modern cements, at a minimum cost. All coarse silica is eliminated. The process functions, almost automatically, to produce a continuous stream of materials, thoroughly mixed and blended, and only under unusual conditions requiring further correction in the kiln-feed storage tanks.

The minerals separation departments were designed and equipped by our engineers and erected and placed in operation under our supervision.

SEPARATION PROCESS COMPANY

CATASAUQUA, PA.

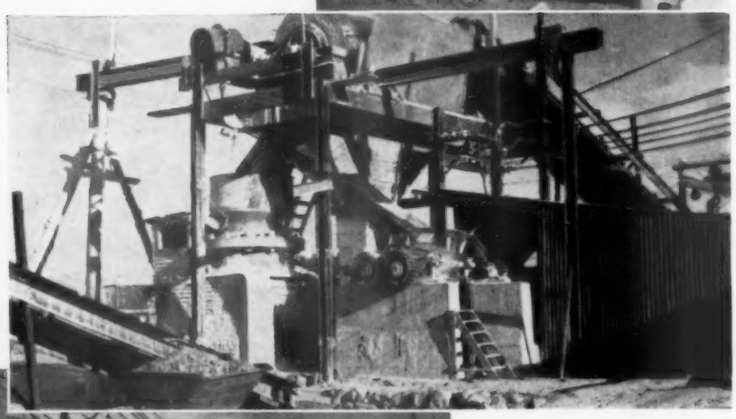
TELSMITH
QUARRY PLANTS
IN THE ARGENTINE

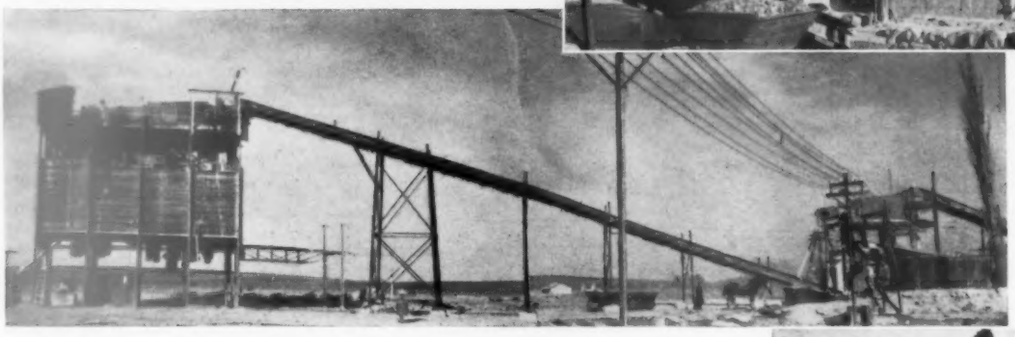
Telsmith Breaker has concrete around upper edge of its crown, and two walls 6 ft. apart form a "bridge" on which are two sets of tracks. Rock may be dumped from cars into both sides of crusher simultaneously.

● In the Argentine . . . as well as elsewhere throughout the world . . . Telsmith crushing equipment has convincingly demonstrated its ability to produce crushed aggregate for roads and concrete building construction *at the lowest cost per ton.*

The plant pictured here is that of J. B. Ripoli & Cia. located near Olivarria, a city about 200 miles south of Buenos Aires. On an average this plant crushes about 1000 tons of very tough granite rock, per 8-hr. day, to minus 2½-in. size.

It includes two Telsmith Crushers—a 20-in. Primary Breaker and a 46-in. Reduction Crusher—shipped in December, 1931. In spite of a steady diet of hard Argentine granite, their crushing performance has been outstanding. Maintenance has been low. During its six years of service, the Reduction Crusher has had no repairs other than manganese wearing parts. The super-strong steel frame and crown and the unbreakable shaft, which distinguish Telsmith gyratory crushers, are always an assurance of continuous output.





(*above*) Crushed aggregate from Telsmith Breaker goes to a rotary scalper which removes all minus 2½ in. aggregate, and chutes oversize to a 46-B Telsmith Reduction Crusher.

(*above*) General view of plant.

(*right*) In Argentine quarries, rock is hand loaded intosidedump cars; trains are hauled up by hoist.

Top of Telsmith Breaker showing its massive crown arms set at right angles to car tracks; and great spread of its receiving bowl.

Telsmith quarry and gravel pit equipment, from crushers to bin gates, and Telsmith engineering service are described in Bulletin Q-15. *Write for it.* Q-C1-38

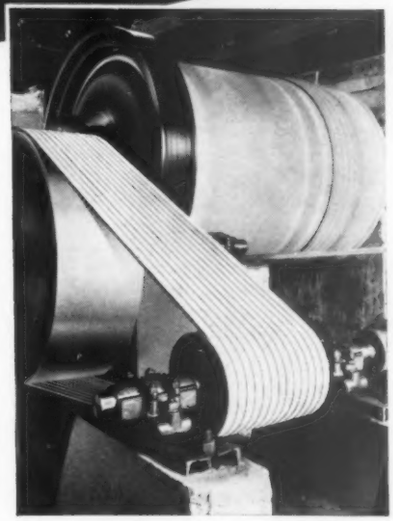
50 Church Street, New York City
211 W. Wacker Drive, Chicago, Ill.
713 Commercial Trust Bldg., Philadelphia, Pa.
81 Binney St., Cambridge, Mass.
412 Westinghouse Bldg., Pittsburgh, Pa.
Brandeis M. & S. Co., Louisville, Ky.

Associates in Canada: Canadian Vickers, Limited, Montreal and Vancouver

SMITH ENGINEERING WORKS
[illegible] CAPITOL DRIVE, MILWAUKEE, WIS.

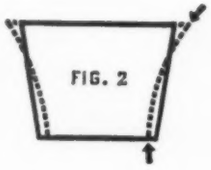
Make this Test WITH ANY V-Belt

You'll See AT ONCE The VALUE of the Concave Side



Bend *any* V-Belt and *feel* it change shape. The top, under tension, *narrows*. The bottom widens. The sides of the belt bulge out. The result is a shape that does not fit the sheave groove—as shown in Figure 1, below.

WHAT HAPPENS WHEN A V-BELT **BENDS**



Now, bend a V-Belt built with the patented *Concave* side. You get the *same* shape change but *now* the new shape exactly fits the sheave groove—as shown in Figure 2. There is no side-bulge. Results? (1) *Uniform* side-wall wear; *longer* life! (2) Full side-wall grip on the pulley. Carries heavier loads without slippage; saves belts and also saves *power!*

The Gates Vulco Rope is the only V-Belt built with the patented concave side.

Engineering Offices and Stocks in All Large Industrial Centers

THE GATES RUBBER COMPANY

Factory Branches

Terminal Building
Hoboken, N. J.

1524 So. Western Ave.
Chicago

741 Warehouse St.
Los Angeles

2213 Griffin Street, Dallas

999 South Broadway, Denver

GATES VULCO ROPE DRIVES

Easy to use? Yes! And now ... Greater Safety than ever with the introduction of ATLAS MANASITE Electric Blasting Caps

Another "ATLAS FIRST"

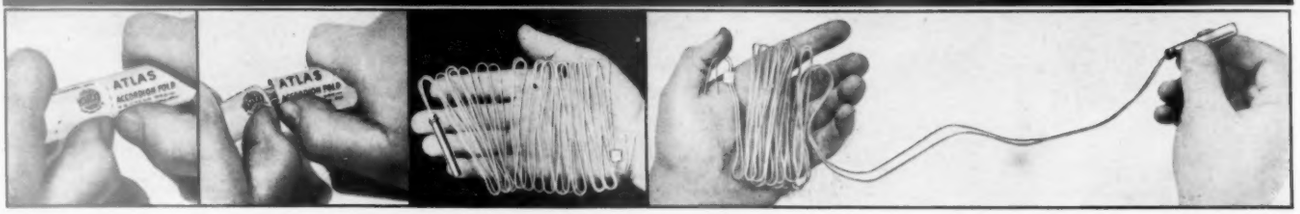
THE Atlas Accordion Fold Electric Blasting Cap package has been so widely accepted that over 75 million have been used.

Why this marked preference? Because it is compact, convenient and gives added safety.

And now, the Atlas Manasite Electric Blasting Cap in the Accordion Fold package gives even greater safety. Atlas Manasite Electric Blasting Caps are more resistant to shock and friction than ordinary electric blasting caps. They offer full detonating efficiency at no extra cost.

In a word—the use of Atlas Manasite Electric Blasting Caps packed in the Accordion Fold packages gives increased effectiveness to all safety precautions.

ATLAS ACCORDION FOLD INDIVIDUAL PACKING



ATLAS POWDER COMPANY, WILMINGTON, DEL.

Cable Address—Atpowco

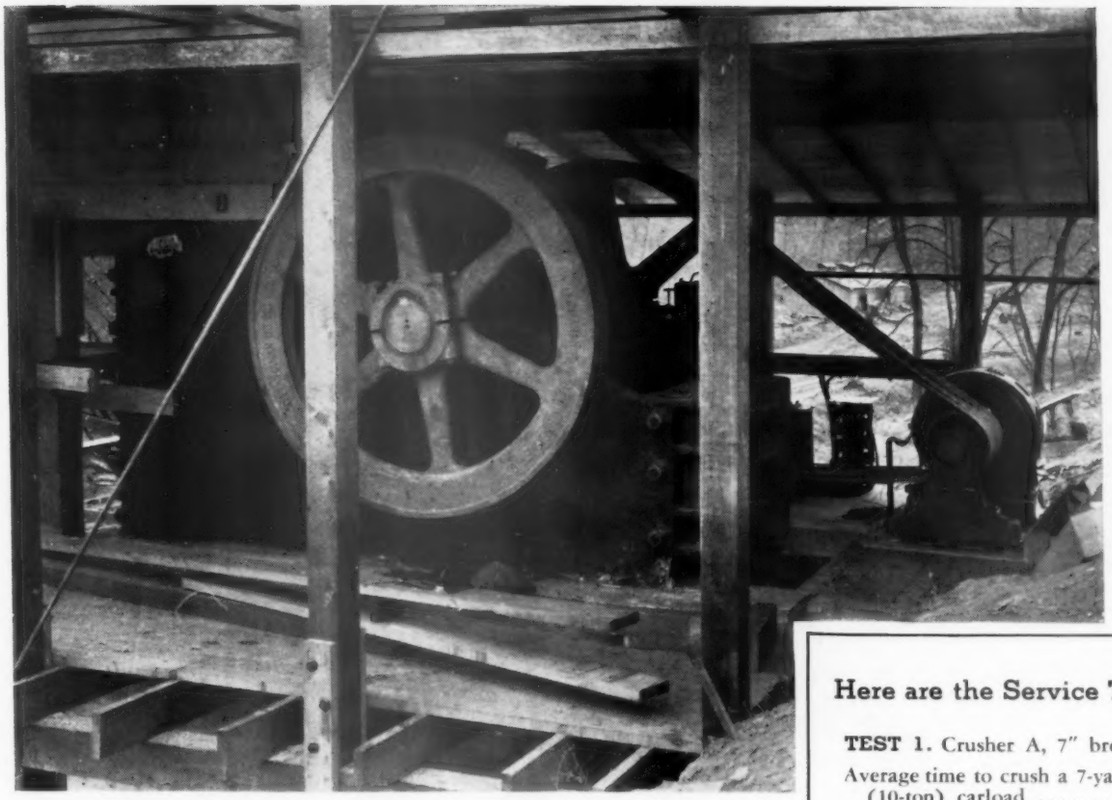
Everything for Blasting

OFFICES

Allentown, Pa.	Houghton, Mich.	Memphis, Tenn.	Pittsburg, Kansas	Seattle, Wash.
Boston, Mass.	Joplin, Mo.	New Orleans, La.	Pittsburgh, Pa.	Spokane, Wash.
Butte, Mont.	Kansas City, Mo.	New York, N. Y.	Portland, Oregon	St. Louis, Mo.
Chicago, Ill.	Knoxville, Tenn.	Philadelphia, Pa.	Salt Lake City, Utah	Tamaqua, Pa.
Denver, Colo.	Los Angeles, Calif.	Picher, Okla.	San Francisco, Calif.	Wilkes-Barre, Pa.

ATLAS EXPLOSIVES

CHEMICALS ATLAS EXPLOSIVES



Why it pays to Specify Birdsboro-Buchanan Crushers

3 Service Tests Reveal Actual Production And Power Consumption Figures

Recently a Birdsboro customer checked his crushing operations to determine a basis for assigning costs.

His equipment consisted of two standard Birdsboro-Buchanan Type C jaw crushers and the necessary storage and handling machinery. The plant was crushing material having a crushing strength of 50,000 lbs. per sq. in.

In the panel to the right, are the details of three service tests he made on these machines. Roughly, he found that he was getting almost double the rated production capacity from these Birdsboro-Buchanan crushers with no noticeable increase in power consumption. In addition, his records showed that repairs and maintenance expenses were under normal expectancy.

This customer's experience is like that of many other mine and quarry operators using Birdsboro-Buchanan crushers. They find these crushers able to reduce large quantities of tough material quickly and inexpensively. That's why it pays to specify Birdsboro-Buchanan crushers for rugged crushing strength.

Here are the Service Test results:

TEST 1. Crusher A, 7" breaker setting

Average time to crush a 7-yard (10-ton) carload ..... 40 Sec.
Average capacity over a 10-hr. period (incl. charging time) 600 Tons/hr.

TEST 2. Crusher A, 8" breaker setting

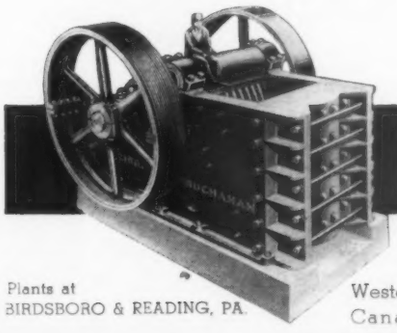
Average capacity over a 10-hr. period (incl. charging time) 450 Tons/hr.
Average of 100 horsepower tests ..... 131 HP.
Peak load horsepower..... 200 HP.

TEST 3. Crusher B, 5" breaker setting

Average capacity 10-hr. continuous feed test..... 450 Tons/hr.
Average of 100 horsepower tests ..... 122 HP.
Peak load horsepower..... 150 HP.

RATED OPERATING CHARACTERISTICS

	Crusher A	*Crusher B*
Jaw opening	48" x 72"	36" x 72"
Tons/hour for sizes	347 for 7" / 396 for 8"	185 for 5"
Horsepower	150 — 200	125 — 150
Shovel sizes	3 — 3½ yds.	2 — 2½ yds.



Plants at
BIRDSBORO & READING, PA.

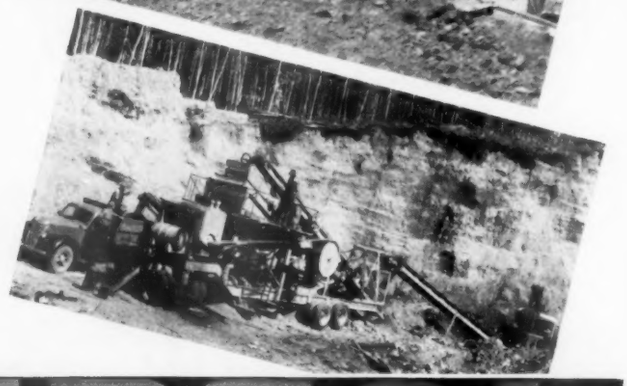
For full details on the construction and operation of these practical Type C jaw crushers, write for Bulletin 110—there is no obligation.

BIRDSBORO-BUCHANAN

A Division of: **BIRDSBORO STEEL FOUNDRY AND MACHINE CO.**
Sales Office: 90 WEST STREET, NEW YORK CITY, U. S. A.
Western Representative: Mine and Smelter Supply Company, Denver • Salt Lake City • El Paso
Canadian Representative: Fraser and Chalmers, Ltd., G. E. Sancton, Mgr., Montreal, Canada

it's UNIVERSALS everytime for better CRUSHING!

Top: South Dakota operator turns gravel into cash with a Universal 8-80 Senior Crushing, Screening and Loading Plant. Next: Universal Dual Crushing, Screening and Loading Plant saves money for Waupaca County, Wisc. Next: Roadside crushing with a 9"x16" Universal Portable Crusher used to build and maintain streets and roads for Hazlewood, N.C. Bottom: Universal 8-80 Jr. Portable Plant owned by Rice Lake, Wisc., contractor, produces materials for construction projects in Wisconsin's vacation-land. In every State, in every county — Universals do it better, faster, cheaper!



Bigger capacities, faster crushing and more uniform product sizes make Universals the better crushing equipment. They cost less to operate and require less maintenance because today's Universal Crushing Equipment is the "cream" of 32 years of development experience and field contact.

Universal builds gravel and stone crushing, screening, washing, loading and storage equipments for every requirement. Contractors, commercial pits and quarries and public officials — whether your operations call for a large or small volume — Universals provide lowest cost per yard crushing.

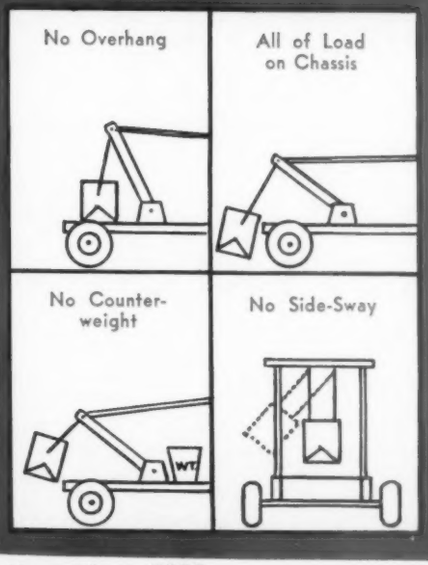
Write for the "inside story" on the type of crushing equipment you need — see for yourself how Universal Equipment is made and why it is the most imitated line of crushing equipment today!

UNIVERSAL CRUSHER COMPANY
619 C Avenue West
Cedar Rapids, Iowa

UNIVERSAL

It's the New Model "LF"

DEMPSTER-DUMPSTER



CALLING ALL CONTRACTORS—All Government Officials—All Road Builders—Quarry Operators—and other material handling Engineers! Investigate the advantages of the new

MODEL "LF" DEMPSTER-DUMPSTER

This Master Stroke of Engineering offers still greater economy and profits to users of Dempster equipment by

decreasing costs on longer hauls and increasing loads on smaller trucks

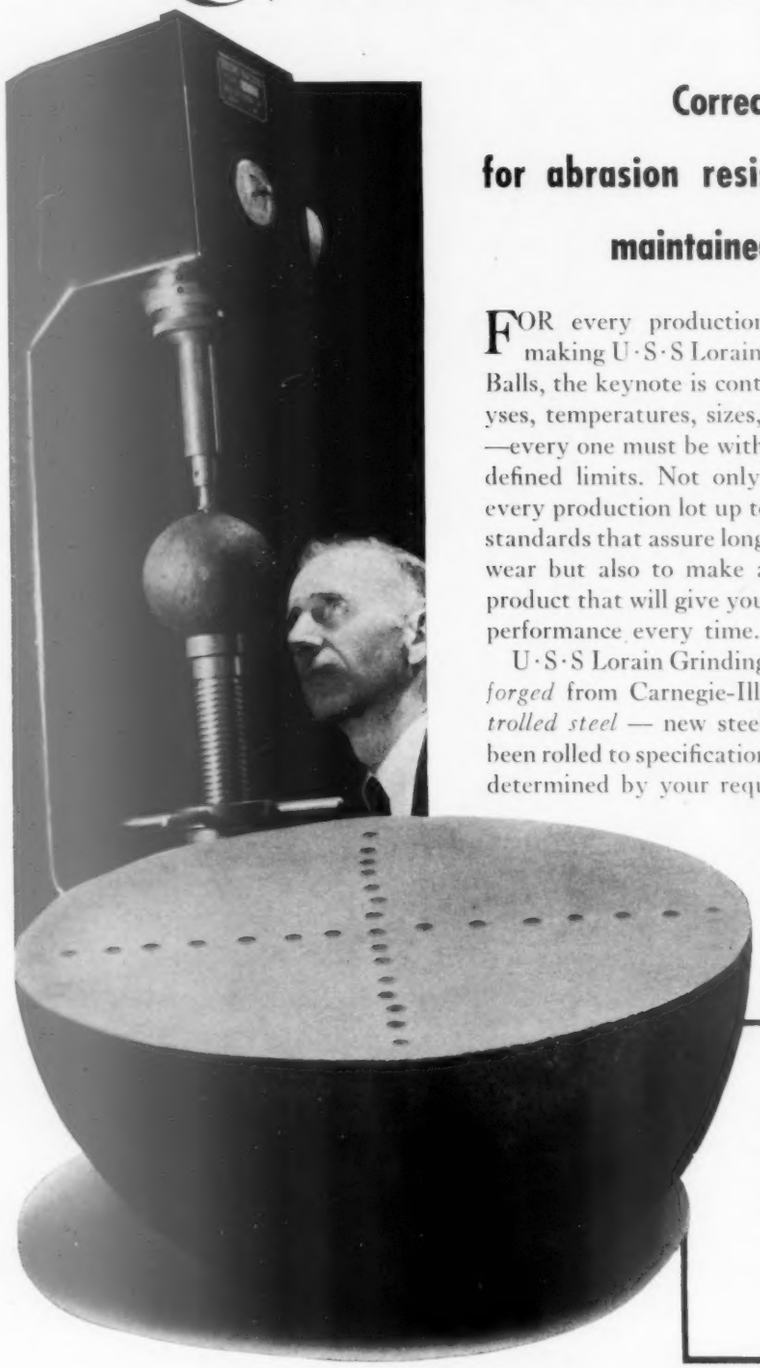
In hoisting and hauling the loaded containers, the entire weight is supported from the center of the chassis instead of the rear, eliminating frame strain and permitting heavier loads. With only a 1½-ton truck, equipped with Model "LF" Dempster-Dumpster unit, you can easily handle 2 cu. yd. fully loaded containers—saving as high as 30% to 50% over your former methods of hand loading.

Write for details of Dempster-Dumpster equipment. Its enviable record of economy on industrial jobs and authorized use on government projects are the best proof of performance.

DEMPSTER BROTHERS, INC. KNOXVILLE, TENNESSEE

WASHINGTON NEW YORK BOSTON NASHVILLE CHICAGO

CONTROL DOES IT!



Correct hardness — essential for abrasion resistance and resiliency — carefully maintained in Lorain Grinding Balls.

FOR every production step in making U·S·S Lorain Grinding Balls, the keynote is control. Analyses, temperatures, sizes, hardness —every one must be within closely defined limits. Not only to make every production lot up to physical standards that assure long and even wear but also to make a uniform product that will give you the same performance every time.

U·S·S Lorain Grinding Balls are *forged* from Carnegie-Illinois *controlled steel* — new steel that has been rolled to specifications that are determined by your requirements. Rigid control is maintained by the use of only experienced workmen and modern, efficient machines. Precision in heat treatment — so necesary for uniform wearing qualities — is checked and rechecked. Laboratory tests back up this production care to guarantee that every lot of Lorain Grinding Balls you buy will give long and uniform wear.

Specify U·S·S Lorain Grinding Balls. They are available in the following sizes: ½″, ⅝″, ¾″, ⅞″, 1″, 1¼″, 1½″, 2″, 2½″, 3″, 3½″, 4″, 4½″, and 5″.

OTHER LORAIN PRODUCTS

Mill Liners and Screens of High Carbon Rolled Plate, Manganese, Chrome Nickel, Chrome Nickel Molybdenum, and plain Carbon Steel or Hard Iron, Hammers for Swing Hammer Mills, also Industrial Cars, and Trackwork.

THIS PHOTO of a cross-section of a U·S·S Lorain Grinding Ball shows a typical set of Brinell machine tests. Hard on the outside to resist constant and heavy abrasion—slightly less hard toward the center to provide resiliency that will cushion terrific pounding and prevent cracking. This test is made regularly on each production of Lorain Grinding Balls.

U·S·S LORAIN GRINDING BALLS

CARNEGIE-ILLINOIS STEEL CORPORATION

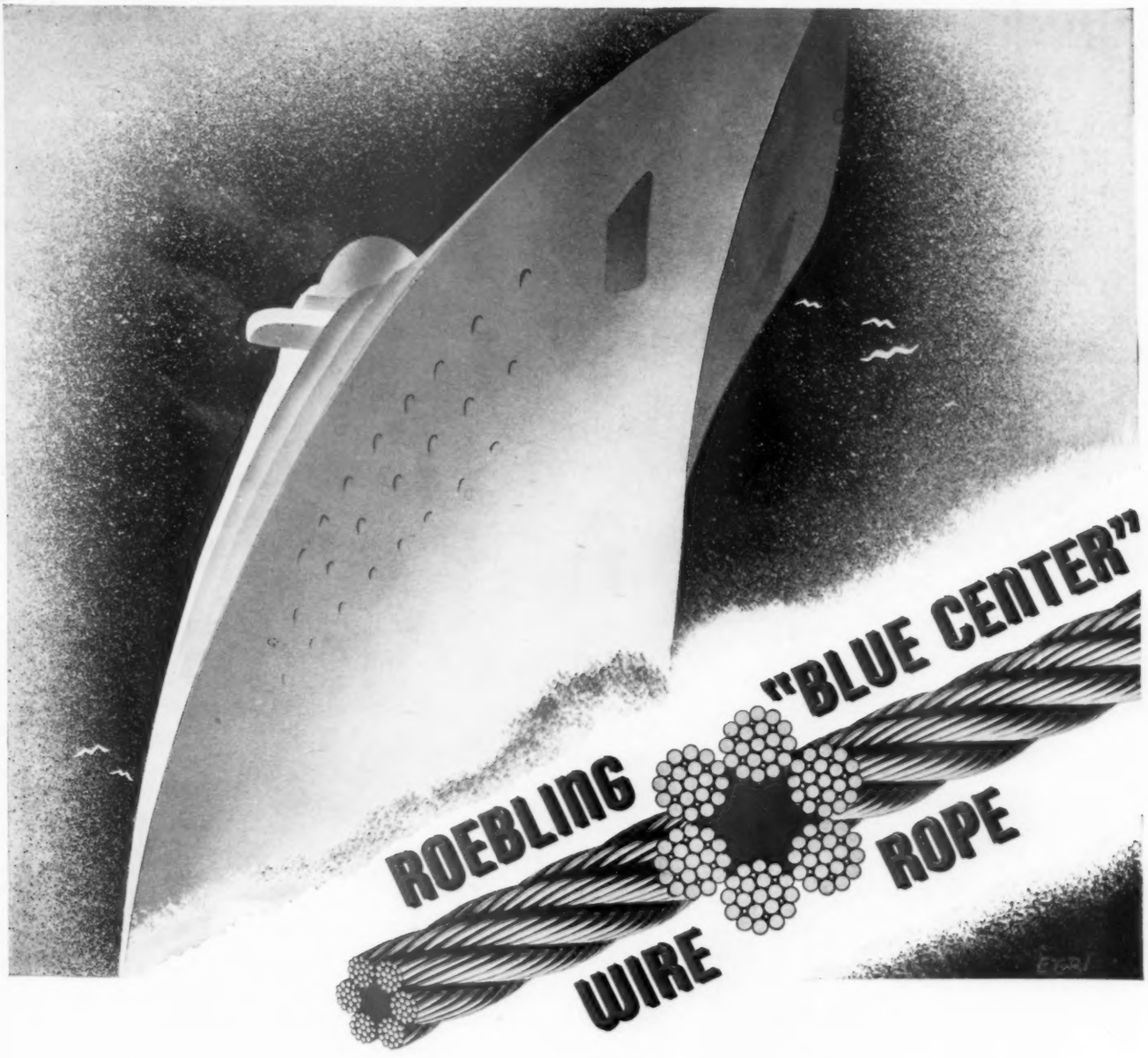
Lorain Division, *Johnstown, Pa.*

Columbia Steel Company, San Francisco, *Pacific Coast Distributors*

United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

SETTING NEW STANDARDS!



Roebling Rope brought to its highest stage of development! Setting new standards of service economy . . . new standards of safety!

JOHN A. ROEBLING'S SONS CO., TRENTON, N. J.
BRANCHES IN PRINCIPAL CITIES

STRONGER—Wire of highest strength consistent with ductility and toughness

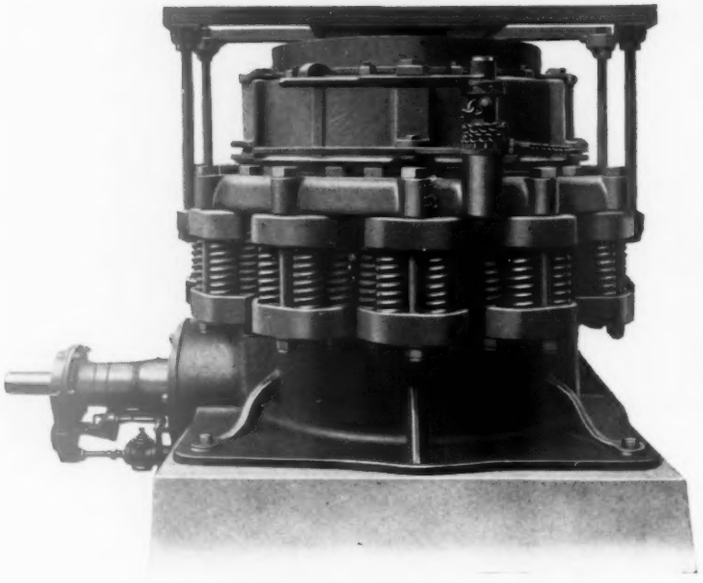
TOUGHER—Provides maximum resistance against wear, sudden shocks, vibration

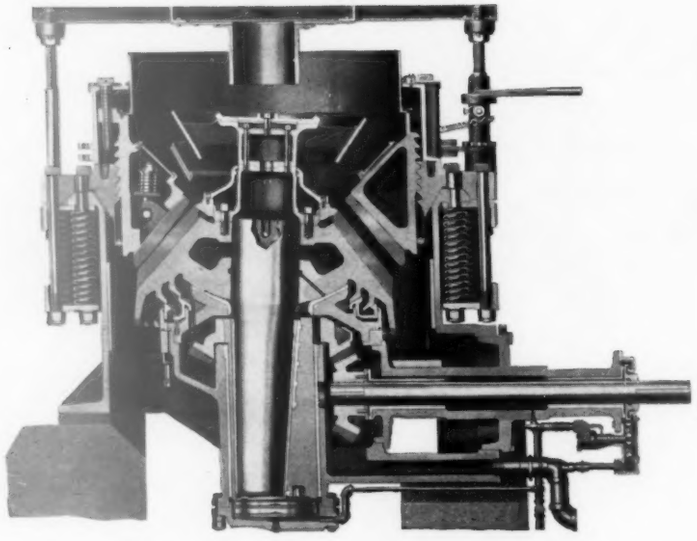
SAFER—Unequalled for uniformity of quality

SAVING—Insures lowest general average operating cost

THE HIGHEST DEVELOPMENT IN ROEBLING WIRE ROPE

These Six Important Features
Should be considered when fine crushing and big tonnage are involved





1 Unusual Crushing Process

Shape of crushing cavity, wide travel of head, and rapid gyration, give to the Symons Cone a process of crushing not found in any other crusher.

2 Great Capacity

Big tonnage maintained even at close setting.

3 Built For Long Life

Major castings of steel — renewable bronze bearings — circulating pressure system of lubrication — manganese crushing members — steel gears with cut teeth — weight of head and shaft and crushing reaction carried on spherical bearing.

4 Spring Protection

Heavy coil springs protect the crusher from tramp iron damage.

5 Size of Product Readily Changed

Bowl can be screwed up or down to change size of product.

6 Feed Evenly Distributed

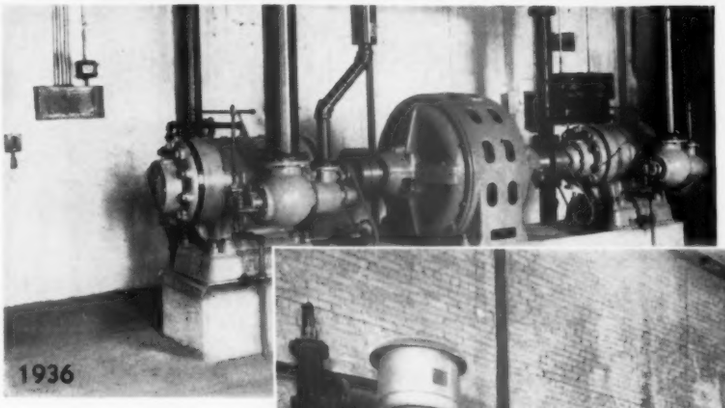
Feed distributor on top of shaft mixes and distributes feed evenly around entire crushing cavity.

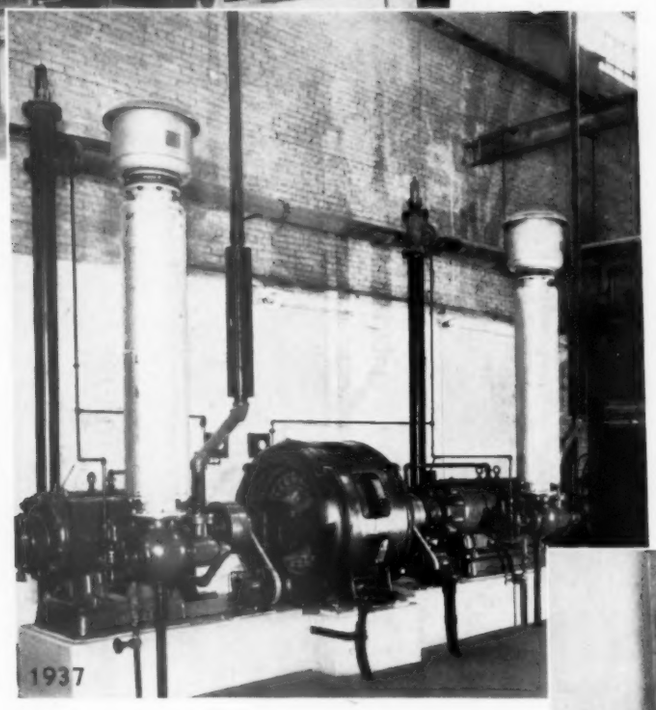
NORDBERG MFG. CO., MILWAUKEE WISCONSIN

NEW YORK 60 E. 42nd St. | **LOS ANGELES** Subway Term. Bldg. | **TORONTO** Concourse Bldg. | **LONDON** Bush House

SYMONS CONE CRUSHERS

REPEAT ORDERS—THE RULE





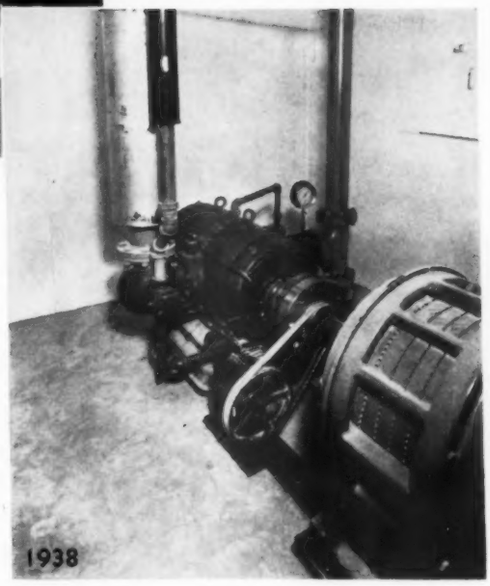
AT
NAZARETH
CEMENT
COMPANY

1936 The Nazareth Cement Company, Nazareth, Pa., purchased their first Fuller Rotary Compressors.

1937 So satisfactory was their experience with this initial installation, both as to operation and savings, that when additional air capacity was required they naturally selected Fuller Rotaries.

1938 Again, for a third time, they purchased a Fuller, which was installed in the Spring of this year.

Once more the statement holds true: Repeat orders are the rule; once a Fuller is installed others generally follow.



FULLER COMPANY
CATASAUQUA, PENNSYLVANIA
Chicago: 1118 Marquette Bldg.
San Francisco: 320-321 Chancery Bldg.

C-34

FULLER-KINYON, FLUXO, AND AIRVEYOR CONVEYING SYSTEMS · · · ROTARY FEEDERS AND DISCHARGE GATES
ROTARY AIR COMPRESSORS AND VACUUM PUMPS · · · AUTOMATIC BATCH WEIGHERS · · · BIN SIGNALS

HAULED OUT THE PROFITS

Most stripping operators would take just one doubtful look at this stubble-covered hilltop, then begin figuring extra clearing and stripping equipment investment from the profits. Contractor R. J. Cremen, Curtis Bay, Maryland, didn't hesitate. He *knew* the underlying gravel was still within profitable range of his LeTourneau Model "G" Carryall.

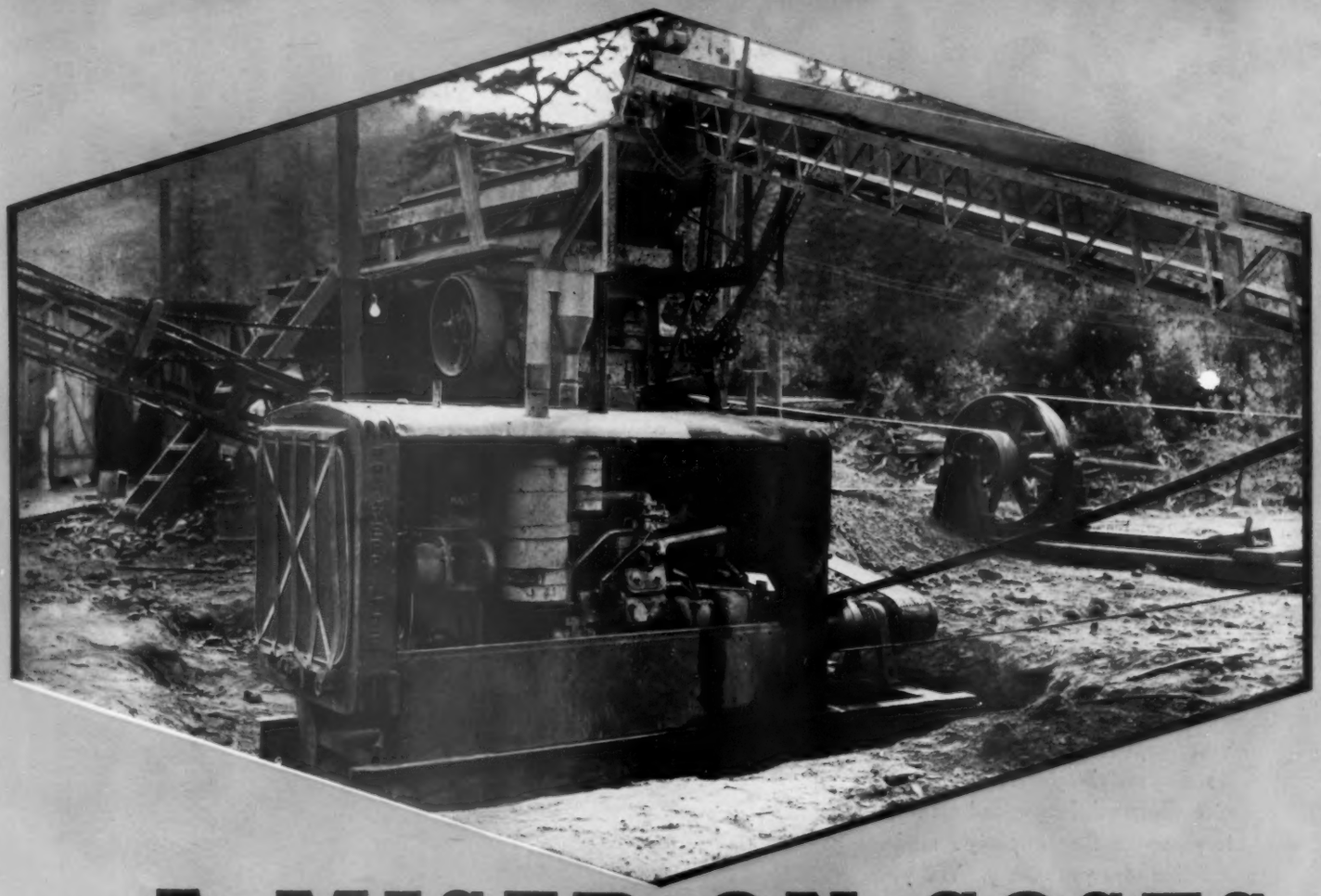
Full tractor power applied to the *natural* suction of the Carryall blade stripped sod, along with the tangled underbrush, sheared off roots and small stumps and boiled all the load into the bowl. From there, the Carryall hauled to the dump, where the positive force-out ejection of the tailgate (an exclusive Carryall feature) instantly cleaned the bowl of all loads. Then savings continued right down through the overburden of sandy loam to the gravel. But profits didn't end here. The same dependable Carryall digging, hauling and dumping action that kept the job "humming" through the top soil, proved equally effective in the actual gravel production.

Proof of these all 'round LeTourneau savings is yours for the asking. Your "Caterpillar" dealer never asks you to accept just his word. He is ready to *show* you with a demonstration *right on your own jobs*. R. G. LeTOURNEAU, INC., Peoria, Illinois, Stockton, California. Cable Address: "Bobletorno." Manufacturers of: Angledozers,* Buggies,* Bulldozers, Carryall* Scrapers, Cranes, Power Control Units, Drag Scrapers, Rooters*, Treedozers. *Name registered U. S. Patent Office.

LETOURNEAU

STRIPPING EQUIPMENT

A GLUTTON FOR WORK



...A MISER ON COSTS

EIGHT—SIXTEEN—or even twenty-four hours a day, if necessary . . . such is the capacity for steady going that is being proved by "Caterpillar" Diesel Engines on thousands of jobs, in scores of industries, throughout the land.

Crushing plants fling a particularly heavy challenge at their ability to "take it." But with ordinary care and maintenance, these precision-built, dust-sealed, positively lubricated engines are piling up records for stamina, dependability and long operating life. They have gained a wide reputation as the most satisfactory type of power for crushers, screens, washers, air-compressors, shovels, cranes, tractors.

Their decisive fuel economy, ready portability, unusual simplicity, and the little attention they require—all are factors toward time and money savings that add up to a sizable extra-profit total in the course of weeks, months and years. For example:

The 125-horsepower "Caterpillar" Diesel Engine shown here drives a 9x36 primary crusher and a 15x24 Cedar Rapids crushing and screening unit. Operates 8 to 16 hours a day on 6 gallons of 8c fuel per hour. Output, 70 tons per hour. Location, near Lewiston, Idaho. Owner, Olaf Nelson.

And—no matter where the job takes them, "Caterpillar" Diesels are backed by the most complete and readily available parts-and-service facilities of any engine in the world. Nine sizes—32 to 160 horsepower. Reduced prices. There's a dealer in your section.

CATERPILLAR TRACTOR CO., PEORIA, ILL.

CATERPILLAR DIESEL POWER

REG. U.S. PAT. OFF.

Precision
WIRE ROPE

"Precision" is easy to say but its accomplishment is something else. Gilmore Wire Rope is precise to 1/1000 of an inch in wire and strand diameter as well as length of lay. And we know of no other Wire Rope that does that.

Besides this, its production is controlled from J & L mines to the completed product.

Gilmore wire rope, with a new plant and precision equipment and many years experience, backed by outstanding metallurgical science, should give you much longer and satisfactory service than any rope made, and thus save you money. Will you try it now? Send for catalog.

Other J & L Steel Products:
Standard Pipe in seamless and welded—Seamless Steel Boiler Tubes—Hot Rolled Shapes—Abrasion Resisting Plates—Bar mill products including Bars for Concrete Reinforcement—Bar size shapes—Track Spikes—Wire Nails and Spikes—Galvanized Sheet Steel Roofing and Siding—Woven Wire Fencing—Barbed Wire—Soft Annealed Wire.

J&L STEEL

GILMORE WIRE ROPE DIVISION

MUNCY · PENNSYLVANIA

JONES & LAUGHLIN STEEL CORPORATION

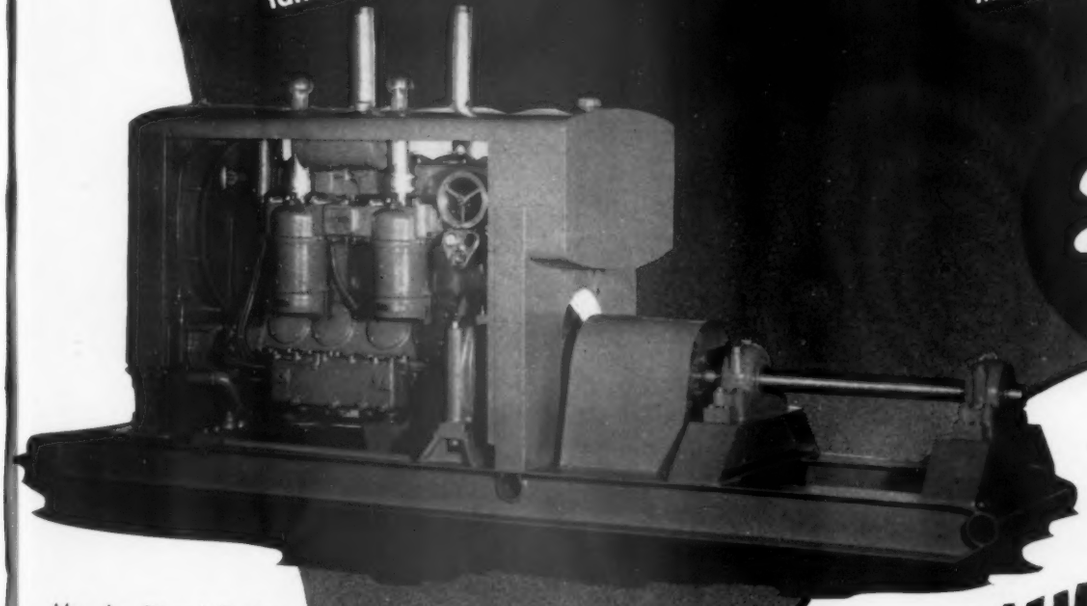
PITTSBURGH · PENNSYLVANIA

MURPHY DIESEL ENGINE FEATURES *that mean new Diesel Economy*

MURPHY DIESEL

- Injection directly into the center of a plain, open, symmetrical combustion chamber, and mechanically controlled at all speeds.
- Fuel injector and pump combined in one unit—a complete fuel system for each cylinder—interchangeable, replaceable in two minutes.
- No high pressure fuel lines with their inherent difficulties.
- Four valves per cylinder insure maximum breathing capacity.
- No separate gas starting engines; or auxiliary air compressors, with their storage tanks and attendant difficulties.
- Pistons specially insulated from the flame of combustion permits continuous high power operation without sticking rings. This eliminates ring troubles; the need for specially treated lubricating oil, and reduces cylinder liner wear.
- Should oil pressure drop below certain minimum pressure the engine will automatically shut itself off.
- All controls unified in a simple hand wheel.
- Few adjustments.
- Compactness—minimum of space required for installation.

MURPHY DIESEL COMPANY LTD.
5317 West Burnham Street
MILWAUKEE • WISCONSIN



Murphy Diesel Engine with outboard bearings

The outstanding advance in **DIESEL ENGINES**

Ask for a **MURPHY DIESEL ENGINE** *on your Equipment!*

CONVENTION TIME IS COMING

....and here are the dates:

January 25, 26, 27

Twenty-Third Annual Convention
National Sand & Gravel Assn.
Netherland Plaza Hotel
Cincinnati, O.

Ninth Annual Convention
National Ready-Mixed Concrete Assn.
Netherland Plaza Hotel
Cincinnati, O.

•

January 30, 31, February 1

Twenty-Second Annual Convention
National Crushed Stone Assn.
Netherland Plaza Hotel
Cincinnati, O.

•

February 7, 8, 9

Nineteenth Annual Convention
National Concrete Masonry Assn.
Sherman Hotel
Chicago, Ill.

Concrete Industries Exposition
Sherman Hotel
Chicago, Ill.

Each year leaders of your industry gather to exchange views on the outstanding problems of the moment and of the future. The 1939 gatherings, listed at the left, again offer you the chance to profit through their educational value; you will, for a few days, enjoy the fellowship of those with problems similar to your own. And at each convention you will find an exposition of machinery and equipment which will point the way to improved operating methods, often at lower cost. The exhibits alone will be worth coming miles to see and to study.

Those in charge of convention arrangements have planned well. Some of the nation's leading authorities are to come and address you. Entertainment features will long be remembered. You will form valuable new contacts and worthwhile friendships. Plan now to attend one or more of these important gatherings. You will enjoy every minute of your stay and go home refreshed and inspired, equipped with new knowledge that will pay dividends. And, to avoid disappointment, make your hotel reservations early.

DIPPER STICKS *that can* "TAKE IT"

sticks of unusually heavy section rigidly connected to each other, both top and bottom, giving them approximately 50% greater resistance to twisting strains than if the inner ends were free and not tied together.

GASOLINE
ELECTRIC
DIESEL
OIL

Built in a range of 18 SIZES 3/8 yd. capacity and Larger

NORTHWEST ENGINEERING COMPANY
1822 Steger Bldg., 28 East Jackson Blvd.
Chicago, Illinois

NORTHWEST

Shovels • Cranes • Draglines • Pullshovels • Skimmers

—and if you have a real Rock Shovel you won't have to worry about output in dirt

ANOTHER WIDE AWAKE SANDMAN! Cuts Costs with a CONTINENTAL

and Gets Out 800 Yards Daily!

This South Dakota sand and gravel producer uses a 4 yd. Continental Wagon Scraper and a Model "K" Allis-Chalmers tractor in his pit.

The Continental digs, loads and hauls in one operation while it's on its way to the grizzly dump box. Traveling over 350 feet per round trip, the Continental keeps way ahead of the crushing plant equipped with a 8" x 36" jaw and secondary roll crusher with a capacity of 75 to 100 yds. of sized gravel and sand per hour. Even in wet weather, the scraper gets 80% loads and so keeps ahead of the crushing operation.

This operator reports that the Continental is supplying his crushing plant at a far lower cost per yard than is possible with other dig and haul equipment; and he has fewer tractors and less equipment to maintain, all of which adds up to big savings.

Additionally, the Continental strips the overburden, built the approach to the grizzly and made the road into the pit, cutting costs still further at this operation.

Sand and gravel producers in many States

have found that Continentals cut their digging and hauling costs up to 50%. What about your pit? Are outmoded methods robbing you? Get the complete Continental story; see for yourself what other operators have done with Continentals.

Made in 4, 5, 7 and 10 yard sizes mounted on low pressure tires or crawlers complete with easily operated hydraulic power control and Be-Ge Pump Unit for rear power take-off.

Sold and serviced by Allis-Chalmers dealers everywhere!

NEW LOW PRICES effective Sept. 20, 1938

CONTINENTAL ROLL & STEEL FOUNDRY COMPANY

Tractor Equipment Division
14400 Railroad Avenue
East Chicago, Indiana

CONTINENTAL WAGON SCRAPERS

PRIMACORD simplifies Main Line Connections

Square knot shown above is employed in the *Main Line only*, when connecting two pieces of Primacord-Bickford. Spliced Primacord should not be used in bore holes.

More work from explosives . . . better fragmentation . . . less moving of equipment . . . quicker removal of broken material. Would you also like to speed up operations while increasing safety and dependability . . . cut down expenses and bank more dollars? Then you need Primacord-Bickford, the improved detonating fuse for modern blasting, because it is . . .

INSENSITIVE to friction, fire, or ordinary shock.

PRACTICALLY INSTANTANEOUS, yet affords relief of burden.

EFFICIENT—gets maximum results from explosives.

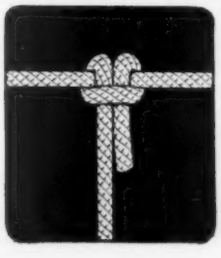
ECONOMICAL in loading time and effort.

LIGHTWEIGHT—only 15 lbs. per 1000 ft.

EASY to handle and hook up.

Send for full details, contained in the free Primacord Booklet.

PRIMACORD-BICKFORD *Detonating Fuse*

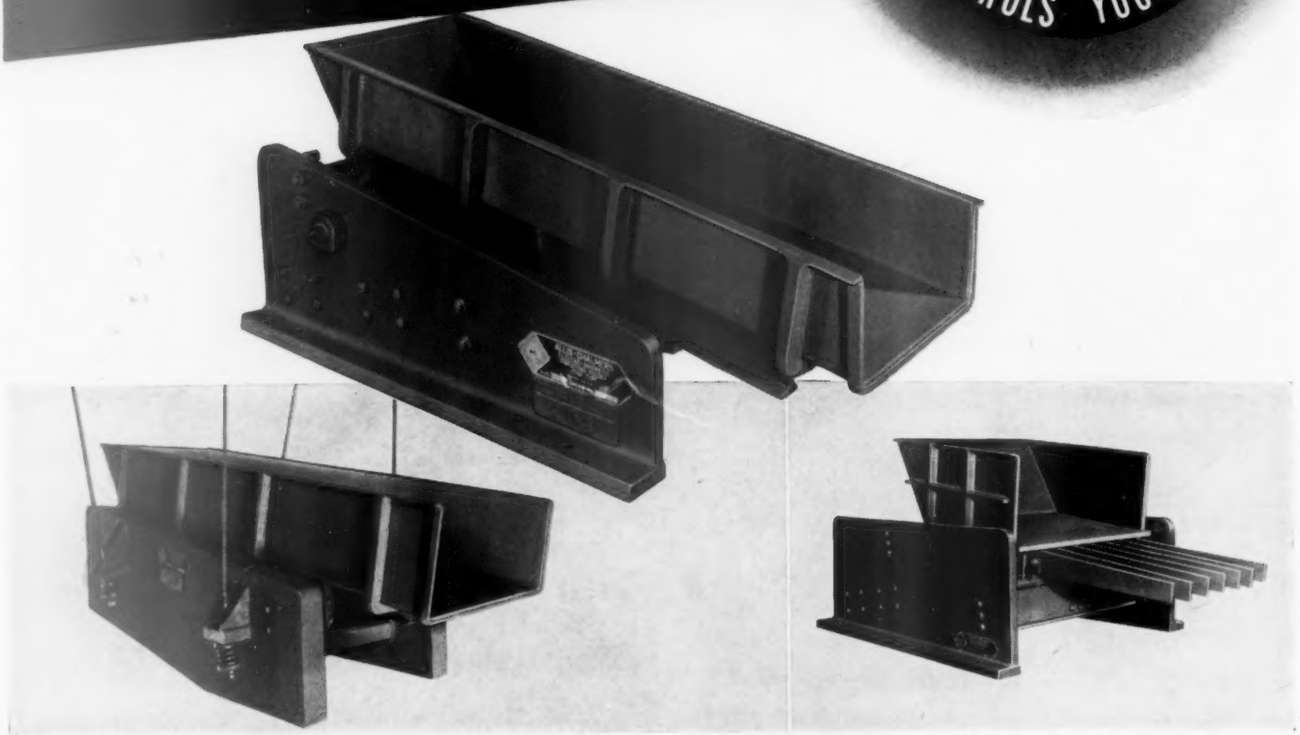


THE ENSIGN-BICKFORD CO.
SIMSBURY, CONN.

MAKERS OF CORDEAU-BICKFORD
DETONATING FUSE

PB2

YOU NOW HAVE FULL CONTROL



Yes, it is as simple as that. . . . With the new Utah Electro-Magnetic Feeders and Conveyors you can control the rate of feed to crushers, screens or processing machinery, instantly. A turn of the dial and the feed flows at the rate you need for most economical production. A slight turn slows it down, speeds it up, or shuts it off. You have absolute and immediate control.

The entire unit is simple, with no rotating or sliding parts . . . no bearings, nothing to lubricate . . . no motor-generator sets. The units are flame proof and ordinary dust has no effect whatever on the working parts. The vibrating motion is produced by a straight line reciprocating armature mounted between two pole pieces. One-half of an alternating current wave is sent to each pole, utilizing the whole wave and making the feeder double acting, and giving it remarkably low power consumption.

It will pay you to learn more about the feeder you can control. Drop a line to your nearest Allis-Chalmers office or the main plant at Milwaukee.

For fine sizing specify the Utah Electro-Magnetic Vibrating Screen. It is similar to the Utah Feeder in operation and principle.

885

CRUSHING · CEMENT AND MINING DIVISION

ALLIS-CHALMERS

MILWAUKEE · WISCONSIN

Construction's Going Up . . .

NOW is the best time to consider modernization of your quarry equipment. The emergency spending program to which the Federal Government is committed, the regular Federal-Aid highway program, and the recent steady gains in private construction only foreshadow the real boom in normal building and construction which is ahead.

If you are in a position to swing into big production at today's low costs, you will be able to make the most of the coming up-swing *the moment it breaks*. You may not want to buy new equipment now, but you will be wise to plan modernization so you can go ahead without costly delay.

Bucyrus-Erie offers you the most complete modern line of big-output quarry machines available. It will pay you to get ready to profit from the up-swing by considering the Bucyrus-Erie machine best fitted for your needs, and by figuring the actual low-cost, high-volume loading you can get with these "Years Ahead" excavators.

Plan now and profit tomorrow!

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

D11

THERE MUST BE A REASON
FOR
CONTINUED POPULARITY

For nearly nine years Pit and Quarry has led all other papers in this field in subscriptions among producers. It is the most popular paper —with its popularity constantly growing, as is shown by the increasing number of subscriptions and the increasing margin of lead.

The reason? At no time has Pit and Quarry compromised with its high editorial standards. It has held its editorial staff, and kept its field editor on the road, wearing out a car in one to two years. The illustrations have always been plentiful, the articles easy to read.

Costly to do this? Yes, it is. But it has been worth the cost, for producers realize that Pit and Quarry has worked *with* them. Savings effected by change from biweekly to monthly publication have been passed on in the form of a reduced subscription price—not pocketed. And the high percentage of subscribers who renew their subscription attests their loyalty to a publication understanding their problems and working *with* them.

The subscription price is still only one dollar for a full years's service. If you are not already a subscriber, why not send in a dollar and learn why other producers find Pit and Quarry so valuable? The cost is small—the results so large—don't delay.

Return This Coupon To-day—Start Your Subscription with the November Issue

PIT AND QUARRY PUBLICATIONS,
538 So. Clark Street, Chicago, Illinois.

Enclosed find remittance for which enter my subscription to Pit and Quarry for..... ...
1 year ($1.00) ..... starting with the *November* issue. (Foreign add $1.00 per year.)

My Name..... Title.....

Company Name.....

Send to (Address).....

We Produce.....

A coast to coast "hook up" of

JOB TEST EVIDENCE

IN NEW YORK CITY—Colonial Sand and Stone Company with the largest diesel-powered truck fleet in the world—171 Cummins Diesel engines—demonstrate savings of $3 to $5 a day per truck, plus the profit from an added daily trip.

ON THE PACIFIC COAST—Consolidated Freight Lines with 114; Pacific Freight Lines with 141; Cantlay & Tanzola with 91 report comparative savings on long line, heavy duty hauls.

● When you consider diesel power for your trucks—whether long haul or short—look for the "Job-test" evidence. Cummins Engine Co., 3613 Wilson Street, Columbus, Indiana.

CUMMINS
Dependable
DIESEL
PIONEER IN MODERN DIESEL DEVELOPMENT

Six Companies you may know have recently purchased and installed

SUPERIOR DIESELS:

For Columbia Quarry Company, Valmeyer, Illinois, a 6-cylinder 12½" x 15"—the FIFTH for Columbia.

For Remington Stone & Gravel Company, Loveland, Ohio, an 8-cylinder 9" x 12".

For Carthage Crushed Limestone Company, Carthage, Missouri, a 4-cylinder 9" x 12".

For Eureka Stone Quarry, Chalfont, Pennsylvania, a 5-cylinder 9" x 12".

For Charles Stone Company, Chester, Illinois, an 8-cylinder 9" x 12".

For Northern Gravel Company, Muscatine, Iowa, a 6-cylinder 9 ' x 12".

You cannot afford to overlook the savings you could make with Diesel power. Why not consult us about Superior Diesels which have been thoroughly tried in your kind of job?

★

THE NATIONAL SUPPLY COMPANY • SUPERIOR ENGINE DIVISION

FACTORIES: Springfield, Ohio; Philadelphia, Pa.

SALES OFFICES: Springfield, Ohio; Philadelphia, Pa.; New York, N. Y.; Los Angeles, Calif.; Houston, Texas.

WHY DRILL RUNNERS PREFER TIMKEN BITS

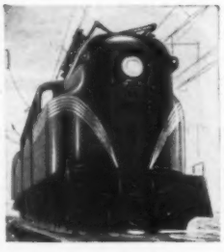
Ask any drill runner who has used TIMKEN Rock Bits why he prefers them to forged steel. His answer will be: "Because I can get more drilling done with less effort."

If you question him further he will tell you that TIMKEN Bits drill faster; that they resist wear better and therefore last longer; that it is not necessary to change steels so often; and that he never has to wait for sharp steels.

The reasons are found in the streamlined design of the TIMKEN Bit, with the shoulder construction that transmits the drill blows evenly to the drilling edges; in the use of TIMKEN Electric Furnace Steel, a tougher and more efficient shock-resistant material; in the special deep-hardening process to which TIMKEN Bits are subjected; and the elimination of reforging.

When you adopt TIMKEN Rock Bits you will save both time and money. It will pay you to get in touch with our nearest authorized distributor and arrange for a trial. Write for name and address.

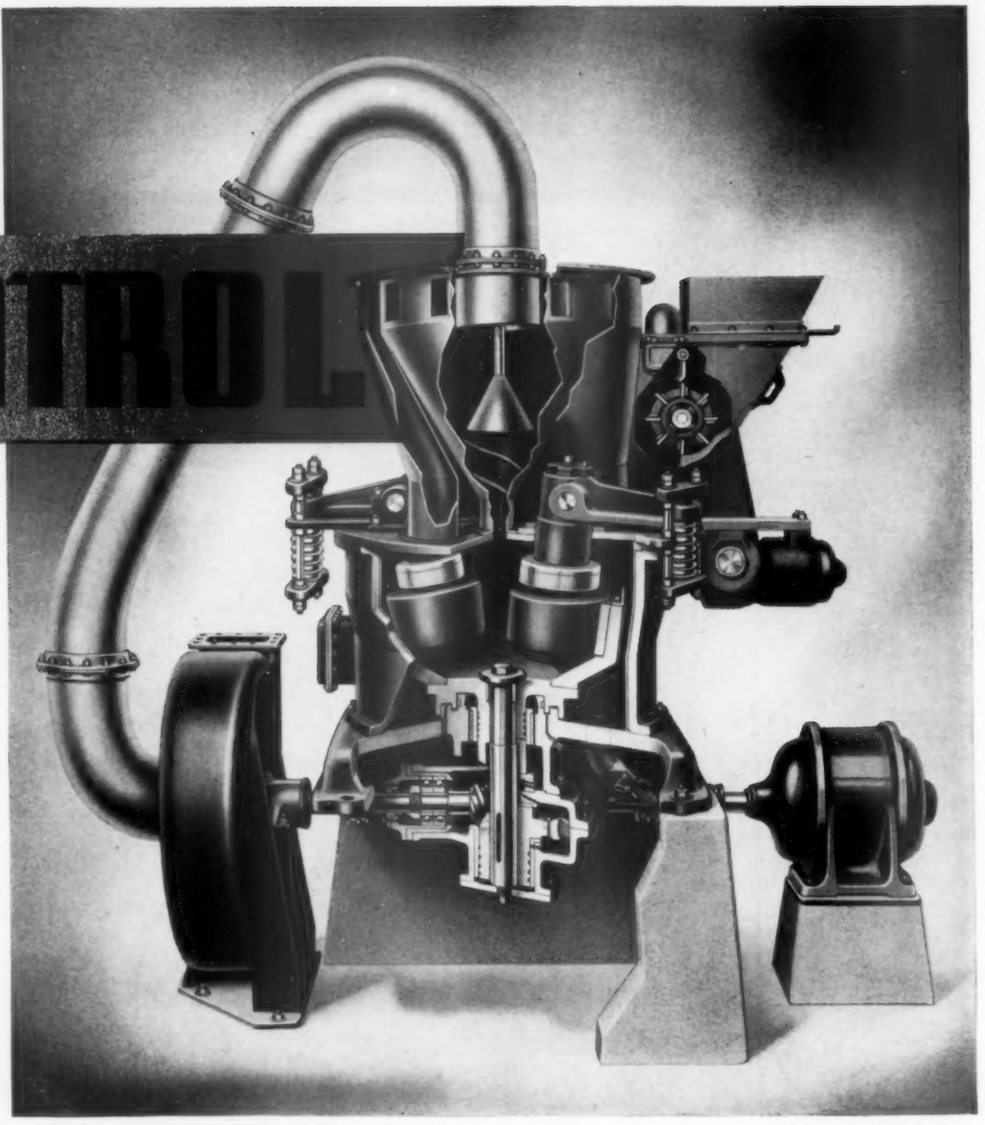
THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO
SERVICE-SALES DIVISION



The Pennsylvania's new Broadway Limited rolls on TIMKEN Bearings.
GLIDE—as you ride a Timken Bearing Equipped train

TIMKEN
ROCK BITS

Easy CONTROL



ALL ADJUSTMENTS
made from outside while mill is running.

FINENESS CONTROL
by simple setting of separator vanes.

AIR-COAL MIXTURE
varied by easy damper adjustment.

PULVERIZING CAPACITY
governed by setting automatic feeder.

GRINDING PRESSURE
by regulating spring adjustment rods.

ROLL ALIGNMENT
saddle adjustment to compensate for wear.

RAYMOND

BOWL MILL

BOWL MILL FIRING

A user says: "The operation of the Bowl Mill is so simple that our man had no difficulty in mastering it."

The flexibility and adaptability of the Bowl Mill make it easy to maintain proper firing conditions and to handle any and all grades of coal regardless of the moisture content. The Bowl Mill responds so readily to changes in kiln demands that it is ideally suited for thermostatic temperature control and automatic feeder control.

The proved efficiency of Bowl Mill Firing is your assurance of a sharp drop in operating costs and a big increase in production when you equip your rotary kilns with this modern system.

RAYMOND PULVERIZER DIVISION
Combustion Engineering Company, Inc.
1321 North Branch Street **CHICAGO**
Sales Offices in Principal Cities
Canada: Combustion Engineering Corp., Ltd., Montreal

Bowl Mills Are Famous for Their Record Low Power Costs

PIT AND QUARRY

Vol. 31 November, 1938 No. 5

CONTENTS

News of the Industry 33
Editorial: The Fair Labor Standards Act . 38
Design of New South American Cement Plant Takes Full Advantage of Breerwood Process of Flotation 40
Minerals-Separation Process Used at Lone Star's New Argentina Plant 52
Producers Continue to Express Views Regarding New Wage-and-Hour Law 57
First Fair-Labor Act Interpretation 62
Industrial Minerals of the Tennessee Valley Discussed at AIME Meeting 64
Lining the Rotary Lime Kiln 65
Electricity Used Exclusively for Heating at This New York Aggregate-Bituminizing Plant 82
A Pioneer Products Firm in Georgia . . . 85
Do a Little Cost-Cutting Before You Consider Price-Cutting 86
Concrete Units from Florida Sands 88
Compact Bituminized-Aggregates Plant Is Quickly Assembled 90
Modern Production Facilities Bring About Increased Sales 92

Personal Mention 68
Traffic News Digest 70
Occupational Diseases and the Law . . . 72
New Machinery and Suppplies 74

Published on the first of each month for producers and manufacturers of Cement, Crushed Stone, Gypsum, Lime, Sand, Gravel and other nonmetallic minerals. Copyrighted 1938 by Complete Service Publishing Co., 538 South Clark Street, Chicago, Ill.

H. W. BAUMGARTNER
President

STANLEY A. PHILLIPS
Vice-President and Directing Editor

Field Editor:
W. E. TRAUFFER

Assistant Editor:
HARRY F. UTLEY

Contributing Editors:
WILLIAM C. RIETH
W. R. CLIFFE

Circulation Manager:
W. T. KLUSSMAN

Advertising Manager:
JAMES E. MONTGOMERY
Telephone HARrison 9357
Chicago, Ill.

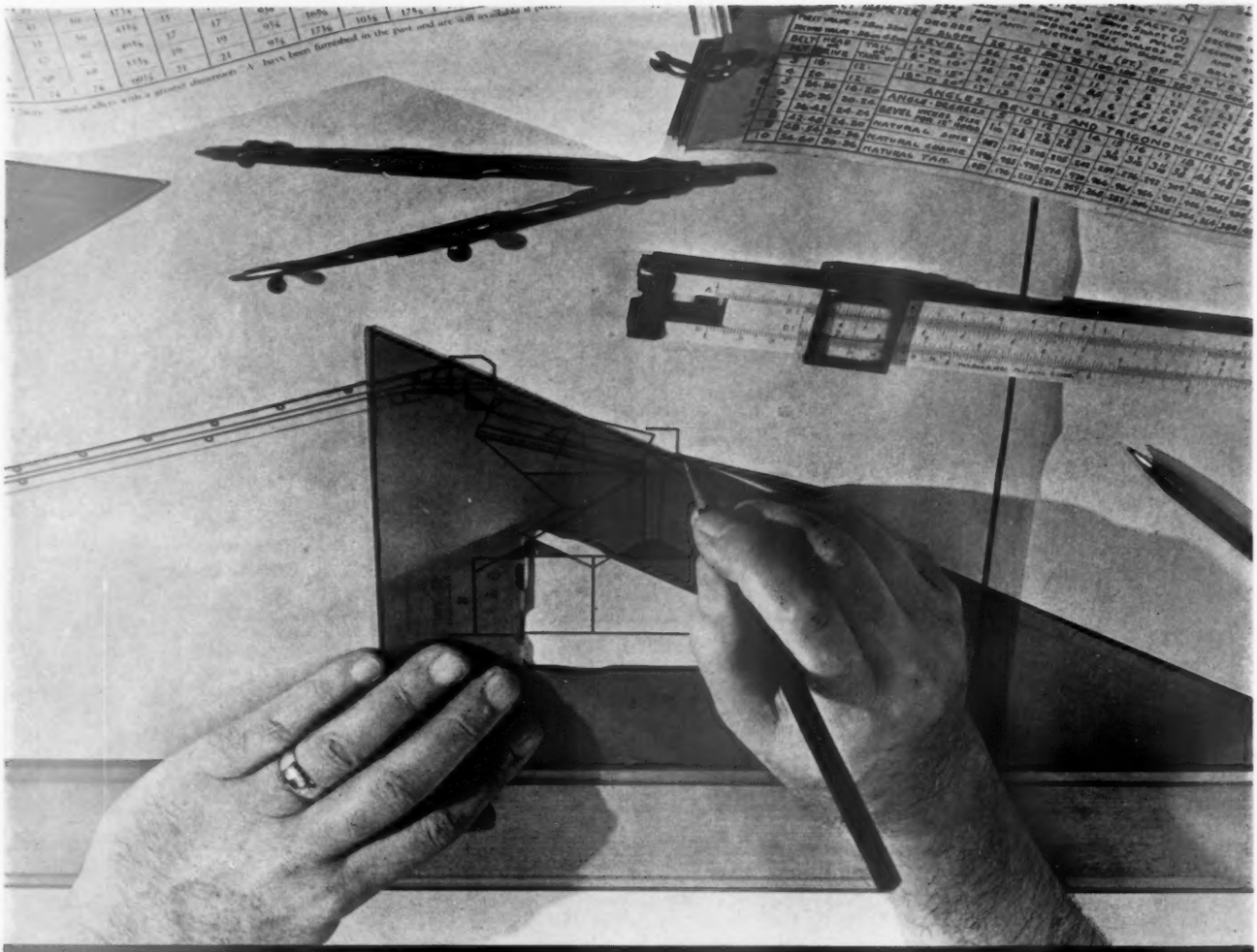
Eastern Advertising Manager:
W. A. BUSCHMAN
Room 430, 122 East 42nd St.
Telephone CALedonia 5-4438
New York, N. Y.

Central Advertising Manager:
W. H. SANDERSON
Auditorium Bldg.
Telephone CHerry 4432
Cleveland, O.

Advertising Representative:
D. R. EGBERT
Chicago, Ill.

Field Representatives:
A. C. PETERSEN
J. K. GARESCHE

MEMBER AUDIT BUREAU OF CIRCULATIONS



IT'S PLANNING TIME . .
IN THE AGGREGATES INDUSTRIES

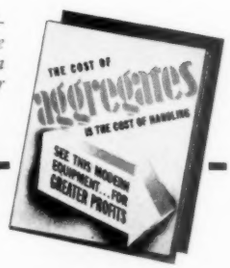
In a few short months plants will be working full blast with hardly time for necessary repairs let alone major improvements. Now is the time to plan smoother production, cleaner product and lower costs. Let Robins suggest changes that will pay for themselves over and over again from savings.

ROBINS MAKES

Belt Conveyors, Belts, Idlers, Trippers, Bucket Elevators, Screens, Screen Cloth, Mead-Morrison Hoists and Grab Buckets and designs and erects entire plants.

MATERIAL HANDLING
ROBINS
EQUIPMENT

Send for the folder "AGGREGATES" showing in picture form the many items you can profitably install to lower your operating costs.



ROBINS CONVEYING BELT COMPANY,
15 Park Row, New York, N. Y.
Please send me your new folder "AGGREGATES."

Name.....
Firm.....
Address.....
City..... State.....

DEC -6 1938

©C1B 398796

PIT AND QUARRY

CHICAGO NOVEMBER, 1938

Cowell Faces Court Again in Dust Fight

RANCHERS BRING NEW ACTION

The Cowell Portland Cement Co., which installed dust arresters on the kilns at its plant at Cowell, Cal., about a year ago after a long court fight instigated by ranchers in that vicinity, was again haled into court in October charged with failing to comply with the specific order of the court.

First tried in the years between 1910 and 1917 on a "public" nuisance complaint, the case was won by the cement company. The ranchers then filed an injunction action and after many years of litigation established through court decree that escape of dust from the plant constituted a "private" nuisance.

The latest affidavit charged that since the plant began seasonal operations May 2, 1938, dust has settled over the Clayton Valley as it did before issuance of the writ, to the injury of crops and the discomfort of residents.

Starts Mineral-Wool Operation at Pontiac

Operations have been started in Pontiac, Mich., by a new concern, the Northern Rock Wool Co.

When in full production, the concern plans to produce 100 tons of mineral wool weekly. Raw material is shipped in from Indiana.

Missouri Lime Makers Face NLRB Complaints

National Labor Relations Board complaints charging unfair labor practices are being prepared against three Ste. Genevieve, Mo., lime companies, it is reported. About 400 employees of the concerns have been on strike since June 2.

The companies affected are: Bluff City Lime Co., Peerless White Lime Co. and Ste. Genevieve Lime & Quarry Co.

Coming Events

November 28 to 30, 1938, Chicago, Ill.—Autumn meeting, Portland Cement Assn., Drake Hotel.

November 30-December 2, 1938, Washington, D. C.—Eighteenth annual meeting, Highway Research Board, National Academy of Sciences Bldg.

January 25-27, 1939, Cincinnati, O. — Annual conventions, National Sand & Gravel Assn. and National Ready-Mixed Concrete Assn., Netherland Plaza Hotel.

January 30, 31 - February 1, 1939, Cincinnati, O. — Annual convention, National Crushed Stone Assn., Netherland Plaza Hotel.

February 7-9, 1939, Chicago, Ill. Annual conventions, National Concrete Masonry Assn., American Concrete Contractors' Assn. and Concrete Industries Exposition, Hotel Sherman.

Ash Grove Celebrates 5-Year Safety Record

More than 800 persons attended the recent safety picnic of the Ash Grove Lime & Portland Cement Co., at Chanute, Kan., celebrating five years of operations without a lost-time accident.

A feature of the outing was an address by W. P. Sabin, Kansas City, vice-president of the company.

The plant office of the Ash Grove Lime & Portland Cement Co. at Chanute, Kan., was partly destroyed by fire a few weeks ago after it had been struck by a bolt of lightning during an electrical storm.

Florida Cement-Tax Case to High Court

WAS HELD UNCONSTITUTIONAL

Florida's $3 a ton tax on imported cement, held unconstitutional by three Federal judges at New Orleans, will be tested in the United States Supreme Court. Assistant Attorney General H. E. Carter of Florida has entered an appeal from the decision.

The tax was levied by Florida's legislature in 1937. After the bill was passed, the house of representatives recalled it from the governor's office and sought to prevent its enforcement by letting it die at adjournment.

The Florida Highway Department decided it was not a law and refused to collect the tax. Florida's Supreme Court then ruled it was validly adopted and ordered the department to proceed with enforcement.

Opponents of the act went into Federal court, and enforcement was restrained.

New Plant to Serve Grand River Dam Job

An extensive aggregates plant and concrete-mixing facilities are to be built shortly to service the Grand River Dam, a Federal-financed project located near Vinita, Okla.

The general contract for the dam was recently awarded to the Mossmann Construction Co.

Resume Silica Mining in Nebraska's Hills

The mining of silica in the hills south of Edison, Neb., was resumed this fall, after the mines had been idle for more than a decade. The Mid-Co Products Company of Kansas City, Mo., has erected a building at Edison for drying and sacking of the material. Albert Hantla of Meade, Kan., and L. L. Eby will be in charge.

Cite 20 Lime Firms for Price Fixing

ALL ARE SOUTHERN OPERATORS

Charging twenty producers of agricultural and chemical lime with fixing and maintaining prices in violation of the law against competition in restraint of trade, the Federal Trade Commission in Docket 3591 named some of the leading manufacturers in the United States. The complaint alleges that these companies maintained an office in Knoxville, Tenn., under the management of their paid representative, Hal S. Covert, which acted as a clearing house for the exchange of information submitted by these producers, "including reports as to the sales of agricultural and chemical lime together with mill and delivered prices, discounts, and terms at which said agricultural and chemical lime is sold or offered for sale." The complaint further charges the existence of a conspiracy "by agreeing to fix and maintain, and by fixing and maintaining, uniform mill prices and uniform delivered prices, terms, and discounts at which said agricultural and chemical lime is to be sold and to coöperate with each other in the enforcement and maintenance of said fixed mill prices and said fixed delivered prices, terms and discounts, by exchanging information with each other and by and through said respondent Hal S. Covert."

The complaint alleges further that these operations have had the effect of lessening, restricting, and suppressing competition in the interstate sale of those products, and that they have enhanced "the prices of those products above the prices which had theretofore prevailed, and which would prevail in natural, normal and open competition," and "to create a monopoly in said respondent lime producers in the manufacture and sale of agricultural and chemical lime in interstate commerce."

The following companies are named in the complaint:

Alabaster Lime Co., Siluria, Ala.
Jesse Allen Lime Co., Burns, Tenn.
Cheney Lime & Cement Co., Landmark and Graystone, Ala.
Dixie Lime Products Co., Ocala, Fla.
Eagle Rock Lime Co., Eagle Rock, Va.
Florida Lime Co., Ocala, Fla.
Gager Lime Manufacturing Co., Sherwood, Tenn.
Green Bag Cement Co., of West Virginia, Lawton, Ky., and Kenova, W. Va.
M. J. Grove Lime Co., Brookeville and Frederick, Md., and Stevens City, Va.
Keystone Lime Works, Inc., Keystone, Ala.
Kimbalton Lime Co., Inc., Shawsville, Va.
Knoxville Lime Manufacturing Co., Knoxville, Tenn.
Ladd Lime & Stone Co., Cartersville, Ga.
Longview-Saginaw Lime Works, Inc., Longview and Saginaw, Ala.
Pine Hill Lime & Stone Co., Pine Hill, Ky.
Ripplemead Lime Co., Inc., Ripplemead, Va.
Riverton Lime & Stone Co., Riverton, Va.
Southern States Lime Corp., Crab Orchard, Tenn.
Virginia Lime Products Co., Inc., Eagle Rock, Va.
Williams Lime Mfg. Co., Knoxville, Tenn.

The respondents are required to answer the charges within twenty days after service of the complaint.

Collectors Show High Efficiency at Wampum

An article published in the October, 1938, issue of PIT AND QUARRY described improvements made at the plant of the Medusa Portland Cement Co. at Wampum, Pa. A feature of this article was the installation of Buell dust-collectors for the collection of flue dust from the four rotary kilns. Now that these collectors have been in operation long enough so that best results can be obtained tests have been made which show that they are salvaging 26.8 lb. of kiln dust per barrel of cement produced. As the plant capacity averages 3,200 bbl. per day, this means that a total of 85,576 lb. of kiln dust, which formerly escaped from the stacks, is now being reclaimed daily.

Buffalo Gravel Firm Makes Concrete Brick

The Gravel Products Corp., Buffalo, N. Y., which has just completed the installation of a Dunbrik plant, held an "opening" party at the new plant on October 15. A number of architects, contractors and other interested persons were present at the festivities.

To Recover Gold at Carroll Gravel Pit

The Carroll Sand & Gravel Corp. of Buffalo, N. Y., after making extensive tests of its deposits at Clarence, N. Y., has found that there is enough gold present to justify the installation of equipment for its recovery. A mill of 150-ton daily capacity is now being erected and is expected to be in operation soon. According to C. H. Lea, one of the owners of the company, a Gibson combination roll-and-ball mill, amalgamators and concentrating tables are to be installed

U. S. Gypsum Awarded Big Rock-Wool Order

The United States Gypsum Co. has been awarded a contract for 3,500,000 sq. ft. of mineral-wool insulation by the Metropolitan Life Insurance Co. for use in the insurance company's $50,000,000 apartment development now under way in the Bronx, New York, N. Y.

Board of Industrial Sand Assn. Gathers

DISCUSS LEGISLATIVE MATTERS

The semi-annual meeting of the Board of Directors of the National Industrial Sand Assn. was held October 4 at the Willard Hotel, Washington, D. C.

T. C. Waters, counsel on workmen's compensation insurance matters, submitted a report concerning rate-reduction activities in the state of New York.

There was considerable discussion regarding the effect of the Fair Labor Standards Act and V. P. Ahearn, executive secretary, was directed to report to members at an early date regarding compliance of the industry with the statute.

Nineteen persons were present, the meeting being presided over by President Russell G. Hay.

Adds Dust Collector and Automatic Stoker

The Bituminous Materials Co., Louisville, Ky., has made a number of improvements at its plant within the last few weeks.

New equipment includes a dust-collecting system and an automatic stoker.

Fullers'-Earth Concern Buys Bauxite Workings

The Floridian Mining Co. of Quincy, Fla., which operates fullers'-earth plants in northern Florida and Georgia, has purchased the bauxite workings near Columbus, Ga., formerly operated by Charles Lennig & Co.

New Law Forces Price Up on Gravel in South

The county highway department at Jackson, Tenn., has purchased 10,000 tons of gravel from the Memphis Stone & Gravel Co. on its bid of $1.16 per ton, delivered.

This is somewhat higher than prices which had been prevailing in this area, bidders claiming that the new wage-and-hour law is forcing them to revise prices upward for future delivery.

A new bath house, 41 ft. by 66 ft. in size, with space for showers, toilets, locker room and an office for the plant foreman, is under construction at the plant of the Lehigh Portland Cement Co. at Mitchell, Ind.

A $10,000 clay-washing plant is shortly to be erected at Lone Pine, Cal., by the California Kaolin Co.

Illustrated above is the sand-and-gravel plant operated at Downer, Minn., by Tony Kost. Trucks discharge material from the pit into the hopper at the left foreground from which an inclined belt-conveyor carries it to the scalping screen. Oversize is crushed and returned to the loading hopper while the "throughs" are taken by another belt-conveyor to the top of the plant where a balanced-action shaker screen, manufactured by Coyle & Roth, Minneapolis, Minn., separates it into four sizes of finished product and the rejects, all accomplished in one pass through the screen. Washing is also accomplished at this screen, sand being reclaimed by a cone separator. In addition to the shaker screen, Coyle & Roth also supplied the conveyor rolls. The sand separator and bins, which allow gravity loading to cars or trucks, were designed and erected by Mr. Kost.

Firm to Merchandise Concrete at Appleton

The Valley Ready Mixed Concrete Co., a new concern, has started construction of a $25,000 plant in the town of Grand Chute, adjoining Appleton, Wis. Two trucks will supplement the plant equipment at the start, and plans call for adding two or three more shortly.

Storage facilities at the plant will provide for 200 cu. yd. of four sizes of aggregate and 300 bbl. of cement. It will be equipped for use of live steam for delivery of concrete in cold weather.

Organizers of the company are C. J. Garvey, W. K. Miller, D. E. Coffey, Frank Murphy and Joseph N. Garvey, all of Appleton.

Recent Equipment Installations ★ ★ ★

The Prairie Sand & Gravel Co., Prairie du Chien, Wis., has installed an Amsco manganese-steel pump. . . . *A ⅜-cu.yd. Bucyrus-Erie shovel has just gone into service at the plant of the Seybold Sand & Gravel Co., Dunkirk, N. Y.* . . . Butler bins and batchers have been erected at the following ready-mixed-concrete plants: Ray Sablain, Lansing, Mich.; Maloney Concrete Co., Washington, D. C.; Schuester Quality Concrete Co., Green Bay, Wis.; and Parker Bros., Houston, Tex.

Niagara vibrating screens are being installed at the new washing plant of the Buffalo Sand Co., Lancaster, N. Y. . . . *The California Portland Cement Co. has installed an Allis-Chalmers air-quenching clinker cooler at Colton, Cal.* . . . A Telsmith vibrating screen, belt-conveyor and crusher are new additions to the equipment at Bonnie Brook Quarries, Carlisle, Pa.

A Besser automatic power stripper and a New Holland crusher have gone into service at the Bennett Concrete Stone Co. plant at Cleveland, O. . . . *The Harris Lime Co., Saylesville, R. I., installed a Sturtevant sledge mill a short time ago.* . . . An Osgood shovel and three Koehring dump trailers are now operating in Graystone Quarries, Johnstown, Pa. . . . *A 200-hp. Cummins Diesel engine is supplying power at the new Keystone plant of the Lyman-Richey Sand & Gravel Corp., Omaha, Neb.*

Cement, Lime Shipments to Increase Slightly

Railway shipments of cement and lime are expected to rise about 3 per cent. in the final quarter of the year, while sand, gravel and crushed-stone loadings will decline 12 per cent. compared with the last quarter of 1937, according to the regular forecast of the Regional Shipping Advisory Boards, recently released.

For occasional use around the plant, the Hedberg-Friedheim Co., Minneapolis, Minn., built this bulldozer blade for attachment to one of its trucks. It is used to clean up under bins and around stock-piles.

Illinois Again Leads in Liming of Soils

PAYS $11 PER ACRE DIVIDEND

After setting a new all-time record and leading all states in the amount of limestone spread last year to sweeten sour soil for the growing of better legumes, Illinois farmers are well on their way to another record and a goal of 1,500,000 tons of limestone for 1938, according to C. M. Linsley, Soils Extension Specialist, College of Agriculture, University of Illinois.

It is estimated that the use of limestone by Illinois farmers last year amounted to more than 1,250,000 tons, which is far in excess of that spread by farmers in any other state. In fact, Illinois' tonnage is greater than the 1,036,000 combined tonnage reported for the six mid-Atlantic states of New York, New Jersey, Pennsylvania, Delaware, Maryland and West Virginia. Kentucky with 819,000 tons reported is next to Illinois in the use of limestone.

Experience of individual farmers and findings of the agricultural college demonstrate that land must have clovers and that clovers must have lime, Mr. Linsley said. Results of studies made at soil experiment fields conducted by the College of Agriculture, shows that limestone pays returns of $11 or more a ton, when corn is worth 50c. a bushel and other crops sell at corresponding prices. At this rate, the 1,250,000 tons of limestone spread by Illinois farmers last year is worth $13,750,000 to them.

For more than a quarter of a century the Extension Service of the Agricultural College has encouraged the use of limestone to correct soil acidity. Increased use of limestone in recent years has been supported by the AAA farm programs which aid farmers in meeting the cost of liming sour land.

In Illinois liming is not done blindly. In coöperation with the Extension Service, farm advisers in many counties are holding soil testing meetings this summer and fall when farmers will learn to test their own fields for limestone needs. Similar tests will be used to show the need for phosphates.

N.L.A. Leaders Hold Washington Meeting

On October 19 and 20, in the Washington Hotel, Washington, D. C., a meeting of the Executive Committee of the National Lime Assn. was held to consider policies to be followed in connection with a number of association activities which have developed during the first quarter of the new fiscal year.

Established Highway Materials Hold Favor

VIBRATED CONCRETE GAINING

Better ways of using the old, established road-building materials are a feature of highway improvement in this country, according to the United States report to the recent International Road Congress at The Hague, Holland. Old established materials are still used on practically all highways. Improvements are in the materials and in their use. The United States Bureau of Public Roads calls attention to some features of the report:

"Increase in the speed and volume of traffic have necessitated marked improvements in the width, grade and curvature of highways.

"There has been a rapid increase in the use of mechanical vibrators in the placing of concrete. The vibrators operate at high speed and cause the concrete to compact into a denser mass, resulting in greater strengths. Experiments have shown that by using less water in concrete mixtures and by vibrating during finishing operations, the strength of concrete pavements can be increased by as much as 10 per cent.

"Considerable progress has been made in development and improvement of the low-cost type of bituminous surfaces. Many of the improvements have resulted from the development of better equipment for mixing, placing, and compacting such surfaces.

"The surface of 'slippery when wet' roads generally is too smooth and becomes slippery because water can cover the surface and act as a lubricant between the road and vehicle tires. The report says this condition is remedied in modern construction by giving the surface a 'sandpaper' finish. As the term implies, this finish is somewhat rough but not rough enough to affect riding qualities seriously. Projecting particles, or ridges, afford resistance to skidding and form small channels through which the thin film of surface water is drained off.

"Tests have shown that the 'sandpaper' finish is safer for another reason. At night the film of water on a smooth road surface acts as a mirror, reflecting the lights of oncoming cars and causing dangerous glare. The surface irregularities of a 'sandpaper' finish prevent formation of a smooth water film, diminishing the amount of light reflected into the driver's eyes.

"Many road failures have been caused by the poor subgrade on which the surface was laid. Highway engineers now have tests that enable them to distinguish between good and bad soils. Greater care is taken in the selection of materials for use in base courses and in stabilized-soil surfaces. Several materials can be mixed with selected soil to improve its quality for surfacing or base course, but it is of greatest importance that the soil mixture contain particles of the right sizes and quality."

$75,000 Fire Destroys Illinois Silica Plant

The silica-sand plant of the Illinois Minerals Co., located near Murphysboro, Ill., was destroyed by fire a few weeks ago just after it had been shut down for an indefinite period.

The plant and equipment were valued at about $75,000.

Report Summarizes Uses on Limestone, Dolomite

Publication of a report headed *A Summary of the Uses of Limestone and Dolomite,* prepared by J. E. Lamar and H. B. Willman, was announced during September by the Illinois Geological Survey at Urbana.

The report is a brief discussion of the uses of limestone and dolomite compiled to provide information for the Illinois stone industry in its search for new outlets, the survey announced. It contains representative specifications for stone for the various uses and includes a list of selected references from which more detailed data may be obtained.

Copies are being distributed free to residents of Illinois for three cents postage. To others, the price is 25 c.

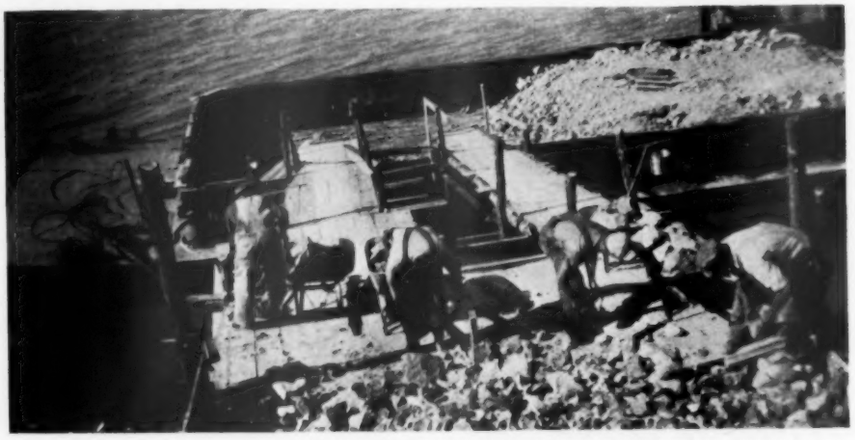
Electrical equipment has been installed by the Bedford-Nugent Sand & Gravel Co., Evansville, Ind., to replace steam-hoisting equipment. Cost of the improvement was $3,000.

Missouri Clay Being Used by Cement Mills

HIGH IRON-ALUMINA CONTENT

Diaspore clay occurs in sink-hole or pot-hole deposits in the northern Ozark region of Missouri. The highest grade analyzes 70 per cent. Al_2O_3, with some iron and silica. Some deposits, however, carry up to 20 per cent. iron and 50 to 60 per cent. alumina. Known as "irony diaspore," the material is not suitable for high-grade refractory work.

However, Tolbert Henson of Perryville, Mo., who owns and operates some of the best-known deposits in Gasconade County, has interested the cement industry in the mineral as a raw-material admixture and it is now being utilized in the production of low-heat cement by one or more manufacturers. The material has been shipped by rail but a few months ago the first bargeload was sent by water down the Missouri River to the Cape Girardeau, Mo., plant of the Marquette Cement Mfg. Co. More than 8,000 tons have been shipped by water so far and Mr. Henson has applied to the War Department for permission to erect a permanent loading dock to facilitate barge shipments.



Loading diaspore clay into barge on the Missouri River.

Employment, Pay-rolls Show Little Change

According to Isadore Lubin, commissioner of labor statistics of the U. S. Department of Labor, both employment and pay-rolls were off slightly in August as compared with July, the drop being 0.7 and 0.9 per cent., respectively.

In quarrying and nonmetallic-mineral mining, however, the reverse was true, employment increasing 1.1 per cent. while pay-rolls were up 6.1 per cent.

Directors Consider New Wage-Hour Law

FURTHER STUDY CONTEMPLATED

A special meeting of the board of directors of the National Ready Mixed Concrete Assn. was held in Washington on September 27. Among the many matters discussed, the applicability of the Fair Labor Standards Act of 1938 received the greatest amount of attention.

There was considerable uncertainty as to whether the industry would be classified as "manufacturing" and so be made subject to the law or as "retailing" and so be exempted from compliance with its provisions. It was the belief of several of those present that the industry, due to the importance of prompt delivery at specified times of the product it makes, should be given a "retailing" rather than a "manufacturing" rating.

The board decided not to apply now for the appointment of an industry committee under the terms of the act.

Wage determination under the Walsh-Healy Act was also discussed and it was found from some government figures, presented by Executive Secretary Ahearn, that more than $2,538,000 worth of ready-mixed concrete had been produced under the law's wage and hour requirements between September 28, 1936 and August 18, 1938. One contract amounted to $160,540, and there were eight other contracts for more than $50,000 each.

At the request of Administrator Walling of the Division of Public Contracts, U. S. Department of Labor, the board submitted the names of ten ready-mixed-concrete producers — including one not a member of the association—who would be invited to attend an informal advisory meeting in Washington on October 14 for the discussion of prevailing minimum wage rates in the industry. Messrs. Paul P. Bird, Joseph H. Dixey, Alexander Foster, Jr., Robert Lyons (non-member), James F. McCracken, A. J. O'Connor, H. F. G. Pelsue, E. S. Simpson, Stephen Stepanian and H. F. Thomson were the ones chosen.

Consideration was also given to the report of the deliberations of the joint meeting of the association's technical committees, which was held on September 26 and is reported elsewhere on this page.

Present at the board meeting were the following:

OFFICERS AND BOARD MEMBERS

V. P. Ahearn (executive secretary), National Ready Mixed Concrete Assn., Washington, D. C.

Alexander Foster, Jr., Warner Co., Philadelphia, Pa.

James F. McCracken (president), American Builders' Supply Co., Louisville, Ky.

H. F. Thomson, General Material Co., St. Louis, Mo.

Stanton Walker (director of engineering), National Ready Mixed Concrete Assn., Washington, D. C.

OTHER MEMBERS AND GUESTS

H. P. Caldwell, Ohio River Sand Co., Inc., Louisville, Ky.

T. H. Fleming, Concrete Transport Mixer Co., St. Louis, Mo.

Lion Gardiner, Jaeger Machine Co., Columbus, O.

S. A. Phillips, PIT AND QUARRY, Chicago, Ill.

N. C. Rockwood, *Rock Products*, Chicago, Ill.

John Settle, Ohio River Sand Co., Inc., Louisville, Ky.

First Rotary Lime Kiln for Northern Arkansas

The first rotary lime kiln in north Arkansas is being installed by Edgar Baker, Batesville, at the St. Clair Marble Co. plant near Guion. The kiln is 90 ft. long and 6 ft. in diameter. It will be fired with crude oil.

A large pile of waste now on the dump below the marble company's quarry is to be utilized first by the kiln, after which quarry operations will be started to supply the new plant.

Barges to Serve New Oregon Gravel Plant

A new sand and crushed-gravel plant will he erect on newly-acquired land near Hood River, Ore., by Loft & Son, aggregates producer in that city.

Deep water facilities at the new properties will enable the plant to be serviced by barges. A. C. Loft, Sr., heads the concern.

Alpha Portland Resumes Operations at Manheim

Following a two-month shutdown, the Alpha Portland Cement Co. has reopened its plant at Manheim, W. Va., giving employment to 125 workers. W. L. Matthes is plant superintendent.

Starts Production of Rock Wool in Kentucky

The cupola at the new mineral-wool plant of the Kentucky Stone Co., located at Mullins, Ky., was fired recently following completion of the new plant.

Discuss Ready-Mixed Standards, Policies

TECHNICAL COMMITTEES MEET

The members of four technical committees of the National Ready Mixed Concrete Assn. met jointly in Washington on September 26 to discuss standards and policies. The committees represented were the Technical Problems Committee, the Standards Committee, the Committee on Truck Mixers and Agitators of the Revolving-Drum Type, and the Committee on Truck Mixers and Agitators of the Revolving Paddle Type.

The revised A. S. T. M. standards covering ready-mixed concrete were discussed and will be published by the association for distribution on a wide scale.

It was decided to recommend to the association's board of directors a consideration of research work relating to volume changes, particularly as to how these are affected by the time that elapses between the mixing and the use of ready-mixed concrete.

The group discussed also the question of what the association's policy should be with respect to various types of truck-mixers, agitators, stationary mixers, plants and plant equipment, measuring, sampling and testing methods, etc.

A report by Prof. Sweetser of tests made of the Transport truck-mixer was presented and considered. There was also a discussion of standards and recommended practices for truck-mixers and agitators of the revolving drum type.

The following committee members and guests were present:

MEMBERS

Charles Ball, Chain Belt Co., Milwaukee, Wis.

T. H. Fleming, Concrete Transport Mixer Co., St. Louis, Mo.

Lion Gardiner, Jaeger Machine Co., Columbus, O.

James F. McCracken, American Builders' Supply Co., Louisville, Ky.

R. M. McLean, Transit Mixers, Inc., New York, N. Y.

H. F. Thomson, General Material Co., St. Louis, Mo.

Stanton Walker, National Ready Mixed Concrete Assn., Washington, D. C.

GUESTS

S. A. Phillips, PIT AND QUARRY, Chicago, Ill.

N. C. Rockwood, *Rock Products*, Chicago, Ill.

The North Bangor Slate Co. plans construction of a slate plant in Bangor, Pa., to cost about $45,000.

EDITORIAL

The Fair Labor Standards Act

THE TENDENCY toward increasing centralization of authority in the United States has been evident in numerous recent interpretations of the scope of the "commerce clause" of the Constitution as given by the Supreme Court. The Fair Labor Standards Act of 1938, which became effective on the twenty-fourth day of October, promises to provide numerous opportunities for the discussion of the propriety, justice and necessity of transferring to some degree the jealously-guarded rights of individual states to the Federal Government. The administration of the law, if we can accept the first interpretative announcement of the Wages and Hours Division of the Department of Labor as a statement of policy, will show a higher regard for the theory of states' rights than for economic justice. As a means for avoiding tests of the law's constitutionality such a policy may be useful, but it will have the inescapable effect of disrupting not only our sense of economic equity but the actual operation of many businesses. This effect will be in addition to whatever minor changes in individual business methods may be demanded by compliance with the law's wage and hour provisions.

In order to avoid, or at least reduce, the chances of the law's being declared unconstitutional, the term "commerce," as used in the act, is defined to mean "trade, commerce, transportation, transmission, or communication among the several states or from any state to any place outside thereof." This echoes the phraseology of the Constitution, wherein the "commerce clause" gives the Congress the power "to regulate commerce . . . among the several states . . ." The framers of the bill sought to make its provisions of wider applicability, but apparently the fear of an unfavorable Supreme Court ruling operated to keep those provisions within the narrower meaning of "among the states." So, intrastate business seems destined to escape compliance with the law, even though uniformity in the application of the wage and hour standards which the law sets up appears to have been one of the chief objectives sought by those who sponsored and voted for it.

In many industries there are numerous examples of competition between businesses which operate locally and those which operate across state lines. There are thousands of businesses which obtain their raw materials within one state and sell all their product within the same state, businesses which do not in any physical sense engage in commerce between or "among" the states. Despite this accidental, deliberate or unavoidable localization of their activities, such businesses have an undeniable effect on other businesses whose operations are not so restricted and they may, therefore, truthfully be said to "affect interstate commerce." That the effects of such local businesses on interstate businesses may be, and often are, very real and important will be evident to anyone familiar with the competitive aspects of business activity.

The wages which an employer pays his workers and the number of hours in which he employs them are two of the most important factors in the determination of the prices at which his products must be sold. Prices are one of the most important factors in determining his selling chances in the competition of the market. In most industries it is only within very narrow limits that the employer can be indifferent to, or only mildly concerned with, the wages and hours of employment. Slight increases in the rates of wages or slight decreases in the number of hours worked may easily upset the relative competitive positions of rival manufacturers, especially in industries where the margins of profit ordinarily realized are very narrow and the changes must be reflected in selling prices.

If one of such competitors, because of his being engaged in interstate commerce in the physical sense, either through the purchase of his raw materials outside his state or through the shipment of his products across state lines, is made to comply with certain wage and hour standards, while his competitor, because of the intrastate nature of his business, is not required to accept those standards, his ability to sell within his customary local within-the-state markets is greatly restricted and may even be destroyed. The other competitor through the same cause finds his selling opportunities suddenly increased by the total or partial elimination of the competition previously offered by the first employer, and as a result may either raise his prices to meet or approach the necessarily higher prices of the other or hold his original prices and thereby widen his market.

THE same requirements which have the effect of hampering the operations of one of two competitors at the same time broaden and facilitate the operations of the other. The competitor operating in interstate commerce may find it necessary, as a protective measure, to meet his local competitor's prices and suffer a loss of profit in order to fulfill the require-

ments, and yet find himself confronted with the same situation on the other side of his home state's lines. In shipping across those lines he may, and very probably will, be brought into competition with other employers operating within the limits of their own states, in which case he would have no alternative except to withdraw from interstate commerce and restrict his activities to operation within his state. That such an alternative is by no means fantastic is evident from the fact that one manufacturer has already notified us of his intention to confine his business to the field encompassed by the lines of his home state.

OBVIOUSLY it is impossible to justify any such discriminatory application of the Fair Labor Standards Act on the grounds of equity or uniformity. It is not fair to penalize one business and to aid another merely on the basis of the geographical extent of their operations. Neither is it fair to discriminate between two companies in the same line of business for any other reason. Nor does it seem to be possible to defend such a partial application of the law's provisions on the grounds of public policy. If employers find it necessary to their existence, or even merely a convenient means of escaping the law's requirements, to withdraw from interstate commerce, and if the law is not to be applied to those engaged in purely intrastate business, it is difficult to see how the law can have any wide effect in raising wage levels or reducing the hours of employment. Besides defeating to a large extent the law's social and economic aims, such a discriminatory enforcement could conceivably seriously alter the economic structure of the country by materially changing the established spheres of operation of thousands of business enterprises.

That these undesirable results appear to be inevitable is shown by the first interpretative bulletin of the Wages and Hours Division previously mentioned. That bulletin clearly states that "the act does not cover plants where the employees work on raw materials derived from within the state and where none of the product of the plant moves in interstate commerce. This is true, even though the product so manufactured and sold locally comes in competition with similar products which have been manufactured elsewhere and have been moved in interstate commerce." Even if it were possible for the owner of a plant producing goods for interstate commerce to segregate his workers so that those engaged in the production of goods for intrastate sale from intrastate materials could be separated from those engaged on products for interstate commerce, he could not differentiate between them in the matter of wages and hours of employment. The interpretation states that the law covers "that large group of employees engaged in manufacturing, processing, or distributing plants, a part of whose goods moves in commerce out of the state in which the plant is located."

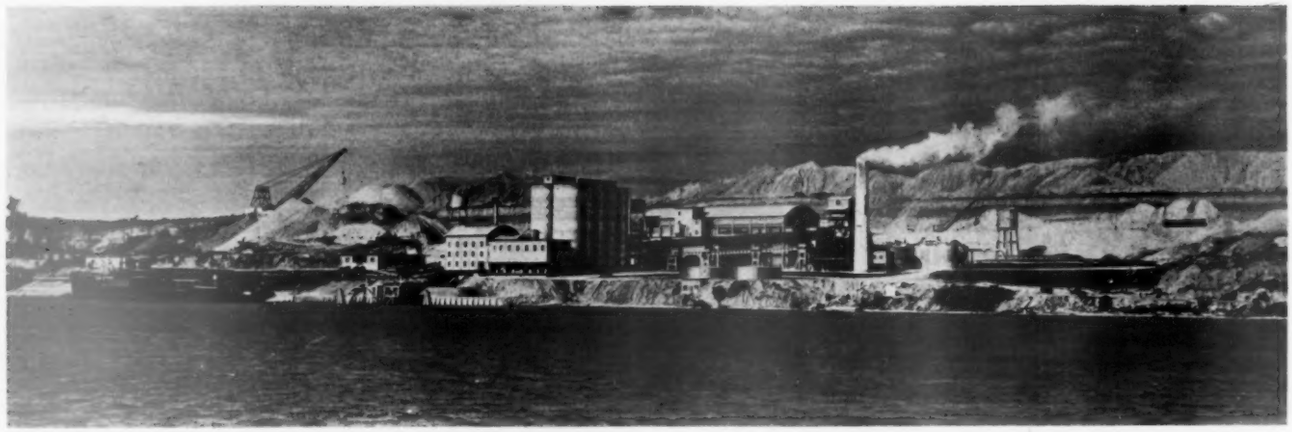
The interests of most business men are so closely interwoven with the economic well-being of the great mass of the people that they naturally feel sympathetic toward the stated objective of the law—the elimination of "labor conditions detrimental to the maintenance of the minimum standard of living necessary for health, efficiency, and general well-being of workers." But those same interests will make them adversely critical of a law that seems to involve inescapable injustices and that seems to make unavoidable drastic geographical readjustments in the scope and operations of thousands of business enterprises. The fault is not entirely with the law, which has been drawn with an obvious regard to the likelihood of its being supported by Supreme Court approval, for the restrictions that make it unfair are those imposed by an archaic constitution, which was conceived and drafted in days when it was impossible to imagine social and economic conditions which have developed since its adoption. Happily for those interested in progressive evolution, the Supreme Court at different times has shown a clear realization of the flexibility that is required of a constitution that is to guarantee the rights and protect the liberties of a changing people in a changing world. It has frequently seen the wisdom of waiving or ignoring the strictly legal interpretations of new laws in favor of their social and economic objectives, their ultimate effects on the happiness and economic well-being of the nation as a whole. The interests of the country will be well served, in our judgment, if the same trend in social policy is evident when this new law is tested for its constitutionality.

MEANWHILE, some will be inclined to hope that state laws, embodying the same provisions as the Federal law, will be enacted to cover the businesses which can not now or later be made to comply with the latter. Such a procedure is not likely to be widely followed or to be quickly adopted; the machinery is slow and undependable, and the motivating desires may not be present or easily organized. There may be strong local sentiment, based on social, economic, political, regional or other differences, that may make such a program impossible of execution. Where there is no desire to attain the objective of the law, there will be no desire for state reinforcement and extension of its provisions.

Yet, regardless of the method, something evidencing a nationwide concern for social and economic conditions that are national in their extent must be done, if the objectives of the Federal law are deemed worthy of support and attainment.

By E. POSSELT, Vice-President, Lone Star Cement Corp.
and W. E. TRAUFFER

Design of New South American Cement Plant Full Advantage of Breerwood Process



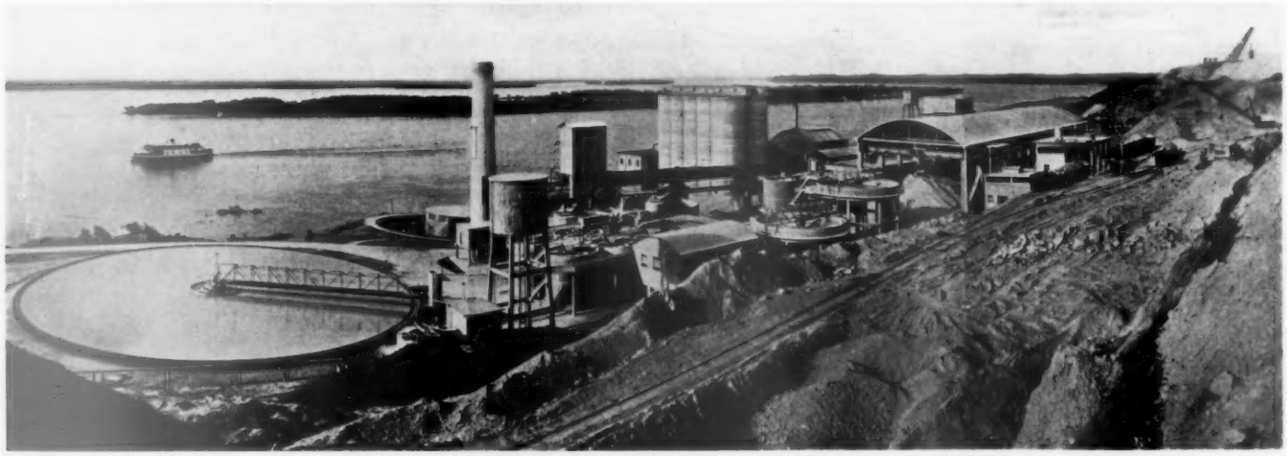
A general view of the plant from the Paraná River with dock at left. Also at the left is the stripping dragline. On a lower level at the right is the rock-loading dragline and some of the quarry cars.

THE new plant of the Argentine Portland Cement Co. (a subsidiary of the Lone Star Cement Corp.) at Paraná, Argentina may mark the beginning of a new era in the cement industry. It is the first plant designed from quarry to pack-house to take every advantage of the Breerwood process of flotation in preparing the available raw material. As a result of this unity of design it has been possible to interrelate the grinding, classification, flotation and thickening steps with respect to chemical-composition control and also to obtain a uniform kiln feed having excellent burning characteristics especially with regard to particle size. The natural raw materials are so poor in cement-making properties that cement could not be made from them by any other known process. No effort or expense was spared to make this an efficient and economical plant capable of producing a high-quality product.

Following the Lone Star company's general policy of using concrete wherever possible, all the structures were designed and built of reinforced concrete. The Argentine firms engaged in this work have developed reinforced-concrete construction to a high degree, and the resulting structures are not only practical but embody architectural features that make the whole factory of impressive beauty.

All the engineering of the plant was done by the Lone Star Cement Corporation's own organization. The detailed designs of the concrete structures, as well as those of certain sections of the equipment, were made by the contractors and equipment manufacturers with whom contracts for the construction and machinery were placed. The general supervision and field engineering were also done by the local organizations of the Argentine subsidiary under the direct control of the Lone Star organization in New York.

Provision has been made for future doubling of the capacity of the plant. This plant was designed for a yearly capacity of 800,000 bbl., and the first few months' operation have demonstrated that this can be easily maintained.



A general view of the plant from above the quarry with the thickener tank, water storage tank, cell house and hydroseparators in the foreground. In the right background are the draglines and the crusher building.

Plant Takes of Flotation

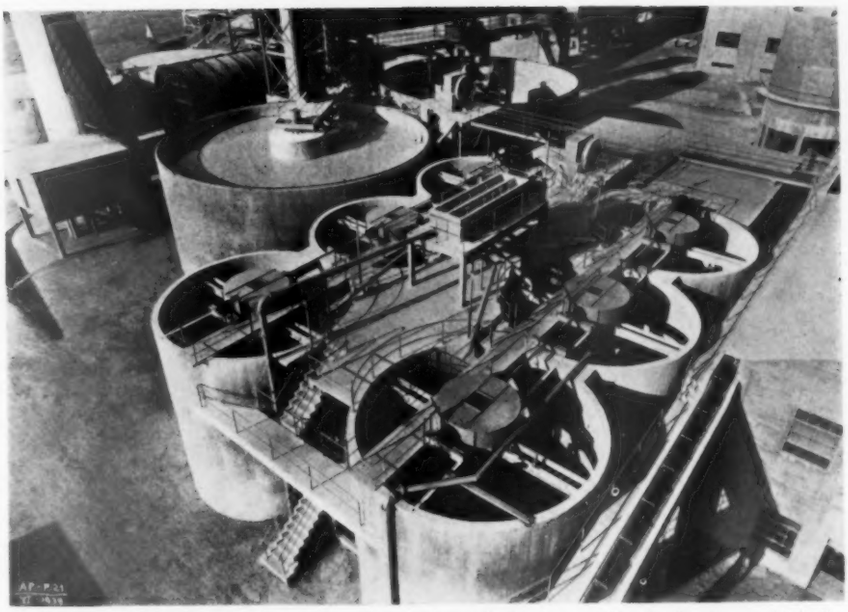
The cement industry in Argentina was established on a modern basis when the International Cement Corp., now the Lone Star company, built its plant at Sierras Bayas in the province of Buenos Aires, whence the first shipment of San Martin cement was made on February 19, 1919. Previous to that day some cement had been manufactured in Argentina in two small plants, but most of the cement needed to meet local requirements had been imported.

Since the San Martin plant was started several other mills have been built, and the industry in recent years has grown so that its total capacity is considerably in excess of the consumption of cement. As the industry developed plants were built where suitable raw materials were found, or at locations from which the cement could be economically distributed, with the result that today cement plants are established in all parts of the country.

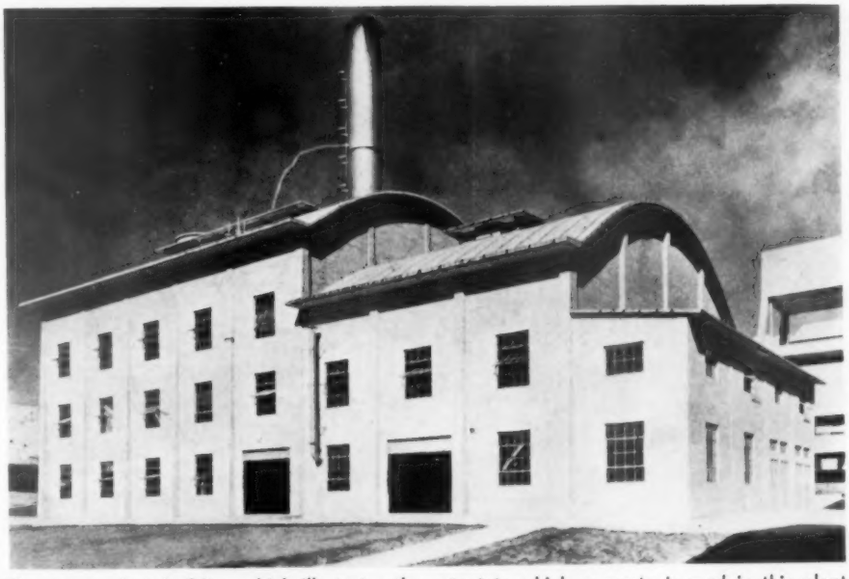
On the banks of the Paraná River, about 200 mi. (322 km.) north of Buenos Aires, is a deposit of limestone plainly visible from the river. The possibility of using water transportation to the larger centers of consumption has long stimulated the desire of cement men from all parts of the world to establish a cement mill in this location, but prospecting of the deposit again and again showed that the lime content was too low and the silica ratio too high for the manufacture of modern Portland cement.

According to historical references the extraction of limestone from the Paraná cliffs dates back to 1660, at which time the Jesuits bought from Cristobal de Garay y Saavedra, grandson of the founder of Buenos Aires, part of his estate on which these lime cliffs were located. The burning of lime was done in small kilns, excavated or placed in the cliffs and lined inside with sandy quartzite stone, while the joints were filled with clay. Wood for fuel was obtained in large quantities from the carob and other trees growing in that vicinity. From that distant date until near the end of the nineteenth century lime manufactured from the Paraná cliffs predominated in Buenos Aires and all along the coast.

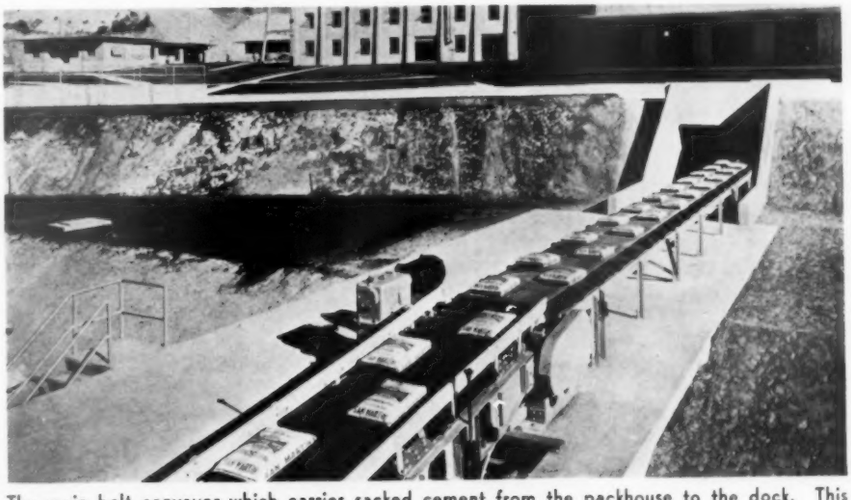
This deposit was thoroughly core-



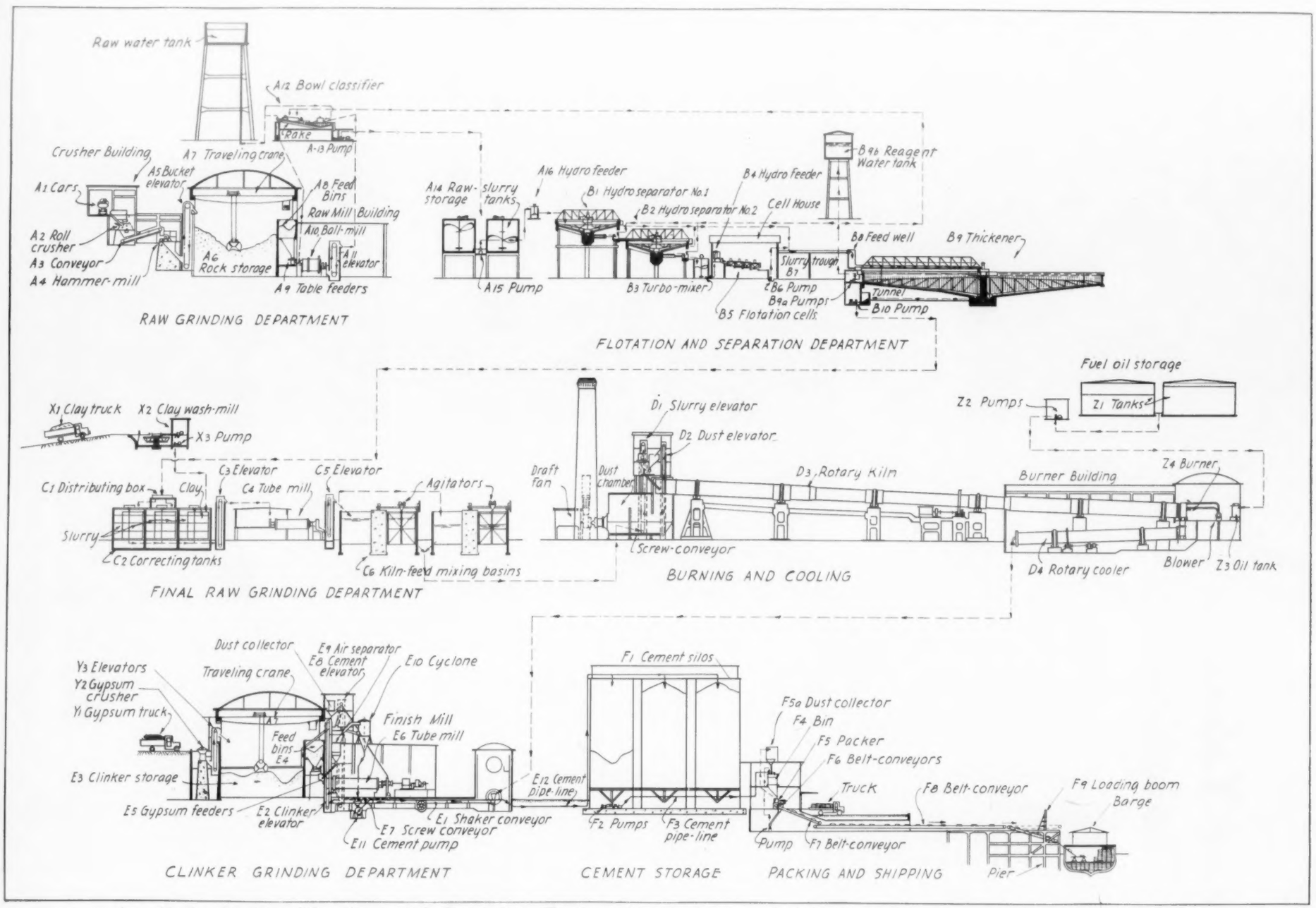
Looking down into the six slurry correcting tanks and the two mixing basins from which the kiln is fed.



The power plant building which illustrates the extent to which concrete is used in this plant and the combination of beauty with utility.



The main belt conveyor which carries sacked cement from the packhouse to the dock. This conveyor is now inclosed for protection against the weather.



A combination elevation and flow diagram of the Paraná plant. The clay used in this plant is now hauled in the regular quarry cars, replacing the truck (X_1) shown.

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE ARGENTINE PORTLAND CEMENT COMPANY, PARANA, ARGENTINA

(Key numbers refer to corresponding numbers on the accompanying flow-sheet.)

	Operation	Order of Flow	Key	Equipment	Description	Motors	Drives
A—RAW-GRINDING DEPARTMENT	Overburden removal			Drag-line	Model 6160, walking, electric, 5-cu. yd. bucket, 200-ft. boom	300-hp.	
				Tractor	Crawler, Diesel		
				Wagon	Crawler, 15-ton		
	Excavating, loading, and hauling			Wagon-drill	Air-operated, 3-in.		
				Blast-hole drill	Model 27-T, 6-in.	15-hp., slip-ring	
				Jack-hammers (2)	⅞-in.		
				Air-compressor	Portable, 100-lb., 312-c.f.m.	75-hp., squirrel-cage	
				Drag-line	Model 85-B, crawler, electric, 2½-cu. yd. bucket, 85-ft. boom	150-hp.	
				Locomotives (2)	26-ton, 4-wheel, oil-fired, 12-in. by 16-in.		
		1	A 1	Cars (6)	Steel, air-operated dump, 10-cu. yd.		
		1	A 1	Cars (10)	Steel, dump, 10-cu. yd.		
	Crushing and conveying	2	A 2	Roll-crusher	36-in. by 60-in., 200-t.p.h.	200-hp. slip-ring	Texrope
		3	A 3	Pan-conveyor	48-in.	10-hp., squirrel-cage	Speed-reducer
		4	A 4	Hammer-mill	Model 5050, 50-in. by 50-in., non-clogging, 200-t.p.h.	250-hp. slip-ring	Direct
				Breaker-plates	Moving	5-hp., squirrel-cage	
		5	A 5	Bucket-elevator (To 6)	24-in. by 8-in. by 11¾-in. buckets.	15-hp., squirrel-cage	Speed-reducer
	Gypsum handling		Y 1	Trucks			
			Y 2	Gyratory crusher	No. 6	40-hp., squirrel-cage	Belt
			Y 3	Bucket-elevator (To 6)	16-in. by 8-in. by 8½-in. buckets	10-hp., squirrel-cage	Speed-reducer
	Stone, gypsum and clinker storage	6	A 6	(Stone from 5; gypsum from Y 3, clinker from 41)			
				Storage	225-ft. by 75-ft.; capacity: stone 14,000 tons, gypsum 4,000 tons, clinker 38,000 bbl.		
		7	A 7	Traveling crane	7½-ton, 75-ft. span, 350-f.p.m. travel	30-hp., slip-ring	
				Trolley	200-f.p.m.	7½-hp., slip-ring	
				Hoist	150-f.p.m.	50-hp., slip-ring	
				Bucket (Stone to 8; gypsum to 43; clinker to 43)	Clam-shell, 3-cu. yd.	50-hp. slip-ring	
	Preliminary raw grinding	8	A 8	Feed bins (2)	1 high-lime, 1 low-lime stone		
		9	A 9	Table-feeders (2) (Rake product from 12)	6½-ft. diam.	7½-hp., slip-ring (2)	Speed-reducers(2)
		10	A 10	Ball-mill	9-ft. diam. by 11½-ft., 50-t.p.h.	450-hp., synchronous	Speed-reducer
		11	A 11	Bucket-elevator	Center-discharge, 39-in. by 78-in.	15-hp., squirrel-cage	Speed-reducer
		12	A 12	Classifier (Bowl product to 13; rake product to 10)	Bowl 20 ft. diam., rake 16 ft. wide	5-hp. and 10-hp., squirrel-cage	Chain
		13	A 13	Slurry pump	Model 5 S, 5-in., 860-g.p.m.	50-hp., squirrel-cage	V-belt
	Slurry storage and feeding	14	A 14	Raw-slurry tanks (2)	23-ft. diam. by 23-ft.		
				Turbo-agitators (2)		20-hp., squirrel-cage (2)	Speed-reducer
		15	A 15	Slurry pump	Model 5 S, 5-in., 1,000-g.p.m.	20-hp. squirrel-cage.	V-belt
		16	A 16	Hydrofeeder	5-ft. diam. by 5-ft.	2-hp., squirrel-cage	Speed-reducer
B—FLOTATION AND SEPARATION DEPARTMENT	Separation and flotation	17	B 1	Hydroseparator No. 1 (Overflow to 24, underflow to 18)	45-ft. diam., 1,000-ton per day	5-hp., squirrel-cage	Chain
		18	B 2	Hydroseparator No. 2 (Overflow to 24; underflow to 19)	45-ft. diam., 1,000-ton per day	5-hp., squirrel-cage	Chain
		19	B 3	Turbo-mixer	Tank, 10-ft. diam. by 15-ft.		
				Agitator	44-in.	7½-hp., squirrel-cage	Speed-reducer
		20		Slurry pump	4-in.		
		21	B 4	Hydrofeeder	5-ft. diam. by 5-ft.	2-hp., squirrel-cage	Speed-rdeucer
		22	B 5	"Rougher" flotation cells (4) (Overflow to 23; underflow to 22a$_1$)	56-in.	7½-hp., squirrel-cage	Direct
				(Underflow from 22)			
		22a$_1$		Middlings pump	Size 4 S, 500-g.p.m.	7½-hp., squirrel-cage	V-belt
		22a$_2$	B 5	"Scavenger" flotation cells (4) (Overflow to 22a$_3$; underflow to 22a$_{3b}$)	56-in.	7½-hp., squirrel-cage	Direct
		22a$_3$		Scavengerpump (To 24)	Size 4 S, 300-g.p.m.	7½-hp., squirrel-cage	V-belt
				(Underflow from 22a$_2$)			
		22a$_{3b}$		Rejects pump (To waste)	Size 4 S, 400-g.p.m.	15-hp., squirrel-cage	V-belt
				(Overflow from 22)			
		23	B 6	Froth pump (From 22a and 23)	Size 4 S, 356-g.p.m.	7½-hp., squirrel-cage	V-belt
		24	B 7	Slurry trough			
		25	B 8	Feed well			
		26	B 9	Slurry thickener (Overflow to 26a$_1$; underflow to 27)	180-ft. diam., 790-ton rock capacity	7½-hp., squirrel-cage	Speed-reducer
		27	B 10	Pump (To 28)	Size 4 S, 200-g.p.m.	40-hp., squirrel-cage	V-belt
		26a$_1$		Pump	Size 6 SS, 1,100-g.p.m.	50-hp., squirrel-cage	V-belt
		26a$_2$		Reagent-water tank (To 12, 17, 18, 22, or 22a$_2$)	50,000-gal.		
GRINDING DEPARTMENT	Clay handling		X 1	Cars (same as rock cars)			
			X 2	Wash-mill	No. 20, 15-t.p.h.	30-hp., squirrel-cage	Silent chain
			X 3	Pump (To 29)	4-in., 400-g.p.m.	25-hp., squirrel-cage	Direct
	Correcting and final raw grinding	28	C 1	Distributing box			
		29	C 2	Correcting tanks:	Concrete		
				Stone-slurry (5)	23-ft. diam. by 23-ft.		
				Clay-slurry (1)	23-ft. diam. by 23-ft.		
				Agitators (6)	Mechanical-and-air	20-hp., squirrel-cage (6)	Speed-reducers(6)
				Air-compressor	Model SS 50, rotary 50-lb., 254-c.f.m.	50-hp., squirrel-cage	Direct
		30		Slurry pump	Size 6 S, 900-g.p.m., auxiliary	60-hp., squirrel-cage	Direct

TABULAR ANALYSIS OF THE OPERATIONS AND EQUIPMENT OF THE ARGENTINE PORTLAND CEMENT COMPANY, PARANA, ARGENTINA

	Operation	Order of Flow	Key	Equipment	Description	Motors	Drive
C—FINAL-RAW-		31	C 3	Bucket-elevator	Center-discharge, 69-in. by 28-in.	10-hp., slip-ring	Speed-reducer
		32	C 4	Tube-mill	7-ft. 2-in. by 26-ft. 3-in., 300-bbl. per hr.	450-hp., synchronous	Speed-reducer
		33	C 5	Bucket-elevator	Center-discharge, 69-in. by 28-in.	10-hp., squirrel-cage	Speed-reducer
		34	C 6	Kiln-feed mixing basins (2)	Concrete, 56-ft. by 25-ft., 5,000-bbl. capacity		
				Agitator arms (2)	Radial arm running on rail	20-hp., squirrel-cage (2)	Speed-reducer
				Agitators (2)	Central revolving	7½-hp., squirrel-cage (2)	Speed-reducer
				Circulating pump	6-in., 900-g.p.m.	60-hp., squirrel-cage	Direct
D—BURNING AND COOLING	Burning and cooling	35	D 1	Bucket-elevator	Center-discharge, 5-ft. 9-in. by 2-ft. 4-in.	10-hp., squirrel-cage	Speed-reducer
		36	D 2	Feeder (Dust from screw-feeder; slurry from 36)	Synchronized with kiln motor	1-hp., d.-c.	Speed-reducer
		37		Pot	Mixing		
		38	D 3	Kiln	Rotary, chain system, multiple gas outlets, 10-ft. 11½-in. and 9-ft. 11½-in. by 400-ft., 100-bbl. per hr.	140-hp., slip-ring	Speed-reducer
				Draft fan		100-hp., slip-ring	Direct
				Louvre damper		¼-hp., squirrel-cage	Speed-reducer
				Stack	Concrete, 9-ft. diam. by 110-ft.		
		39	D 4	Cooler	Rotary, 9-ft. by 120-ft.	75-hp., slip-ring	Speed-reducer
E—CLINKER-GRINDING DEPARTMENT	Clinker grinding	40	E 1	Conveyor	Reciprocating, 16-in. by 124-ft.	15-hp., squirrel-cage	Speed-reducer
		41	E 2	Bucket-elevator	Center-discharge, 49-in. by 26-in.	10-hp., squirrel-cage	Speed-reducer
		42	E 3	Clinker storage (To 7) (Clinker and gypsum from 7)	38,000-bbl. capacity		
		43	E 4	Feed bins (2)			
		44	E 5	Feeders (2) (From 44 and 48)	Belt- and pan-conveyor, constant-weight	½-hp. and ¼-hp. d.-c.	Speed-reducer and chain
		45	E 6	Tube-mill	8-ft. by 40-ft., 130-bbl. per hr.	1,050-hp., synchronous	Speed-reducer
		46	E 7	Screw-conveyor			
		47	E 8	Bucket-elevator	69-in. by 32-in.	20-hp., squirrel-cage	Speed-reducer
		48	E 9	Air-separator (Tailings to 45, fines to 49)		35-hp., slip-ring	Direct
				Fan		125-hp., slip-ring	Speed-reducer
		49	E 10	Cyclone (Cement to 50, air to fan)			
				Dust filter		2-hp., squirrel-cage	Speed-reducer
				Filter fan		10-hp., squirrel-cage	Direct
		50		Tank			
		51	E 11	Pump	Pneumatic-conveying system		
				Air-compressor	Rotary, 60-lb., 650-c.f.m.	125-hp., synchronous	Direct
				Air-receiver	4-ft. by 12-ft.		
		52	E 12	Cement-line			
F—STORAGE, PACKING AND SHIPPING	Cement storage, packing and shipping	53	F 1	Silos (6) and interstices	Reinforced-concrete, 32-ft. diam. by 82-ft., 124,000-bbl. capacity		
		54		Rotary valves (38)	14-in.		
		55	F 2	Pumps (2)	Portable, on trucks, 7-in., 400-bbl. per hr.	100-hp., squirrel-cage (2)	Direct
				Air-compressors (2)	Rotary, Size C-150, 40-lb., 722-c.f.m.	100-hp., synchronous (2)	Direct
		56	F 3	Pipe-line			
		57	F 4	Bins (4)			
		58	F 5	Bag-packers (4)	Automatic 4-spout	25-hp., squirrel-cage (4)	V-belt
		59	F 6	Belt-conveyors (2) (To trucks or 60)	30-in., reversible	3-hp., squirrel-cage (2)	Speed-reducers
		60	F 7	Belt-conveyor	Inclined, 42-in.		
		61	F 8	Belt-conveyor	42-in. by 140-ft. 5-in.	15-hp., squirrel-cage	Speed-reducer
		62	F 9	Belt-conveyor (To boats and barges)	Boom		
	Kiln-dust collection and handling			Dust-chamber (Dust to 37; air to kiln-draft fan)			
				Screw-conveyor			
				Screw-conveyor			
				Bucket-elevator	39-in. by 14-in. buckets	3-hp., squirrel-cage	Speed-reducer
				Bin			
				Screw-feeder (To 37)		1-hp., squirrel-cage	Speed-reducer

drilled and analyzed by the Argentine Portland Cement Co. a number of years ago with the same results as those described above—the lime content was found too low, and the deposit was deemed unsuitable. However, when the Breerwood flotation process was developed, the Lone Star Cement Corp. found, from the data it had accumulated, that this material could be successfully used for making high-grade Portland cement, so the property, containing in the deposit sufficient material for making more than 50,000,000 bbl. of cement, was purchased in the latter part of 1935. Extensive research and experiments were necessary to determine the characteristics of the material before any engineering of the plant could be done, but, nevertheless, the plant was completed, and the first shipment was made on February 19, 1938, the nineteenth anniversary of the first shipment of the original San Martin cement from Sierras Bayas.

The Paraná plant is built of concrete throughout and is equipped with the most modern machinery. It was constructed during a period when foreign exchange was tightly controlled, but nevertheless the equipment was obtained from those countries where the most suitable machinery was available. Seen from the river, when passing on any of the many steamers that travel up and down the Paraná, the plant presents an impressive sight. In the background the ledge of white limestone overlaid with a heavy overburden gives an example of efficient, modern handling of material. The beautiful concrete structures of the plant proper on the banks of the river and the excellent facilities for water shipment in front complete the picture. Many interesting engineering features were embodied in the design and construction of the plant in order to obtain the high efficiency required.

The 2½-cu.yd. electric crawler dragline shown loading rock into quarry cars.

The raw-material deposit consists of an almost horizontal layer of a conglomerate limestone, approximately 35

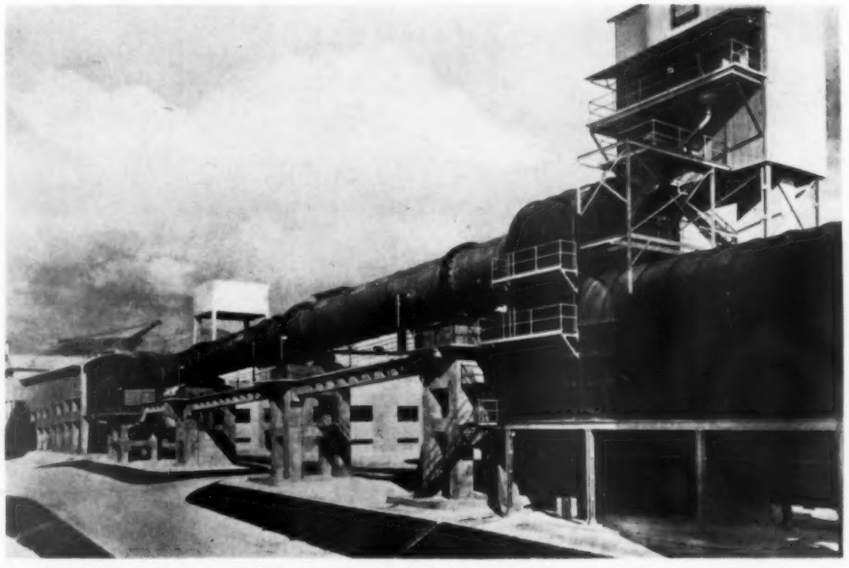
ft. (11-m.) thick, overlaid with from 40 to 60 ft. (12 to 18-m.) of sandy clay. An electric walking drag-line with a 200-ft. (61-m.) boom and a 5-cu. yd. (3.8-cu. m.) bucket excavates this overburden and overcasts it on the quarry floor after the limestone has been removed. The capacity and efficiency of this machine make it possible to handle this large amount of overburden at a very low cost. The excavating is being done along a nearly straight face about 4,000 ft. (1,200-m.) long, working in both directions from the crusher building. A Diesel tractor and bulldozer are also used.

A 3-in. (76-mm.) wagon-drill, a 6-in. (152-mm.) well-drill, and ⅞-in. (21-mm.) jack-hammers are used to drill the blast holes. A light charge of dynamite is sufficient to break up the soft rock, which is a shell deposit, decomposed and solidified. The character of the rock and the advantages of being able to load and transport the rock on the top of the lime-bearing strata which is at the same level as the crusher, prompted the selection of a drag-line for this purpose. This electric crawler drag-line has an 85-ft. (25.9-m.) boom and a 2½-cu. yd. (1.9-cu. m.) bucket. As this drag-line moves along the face in removing the rock it is preceded on a parallel path by the stripping drag-line.

The stone is loaded directly into 10-cu. yd. (7.6-cu. m.) steel quarry cars. The quarry track is of standard American gage which happens to be the same as that used by the Entre Rios Rwy., which may in time run a spur into the plant. Two 20-ton oil-burning steam locomotives are used to haul the rock to the crushing plant. Underlying the stone is a thin stratum of clay, some of which is also used in the plant. The drag-line occasionally loads a trainload of this clay, which is hauled on a side-track to the 30-ft. (9.14-m.) diameter clay washer. A 4-in. (102-mm.) pump transfers the clay slip to one of the six correcting tanks to be described later.

The 5-cu.yd. electric walking dragline which removes the overburden and overcasts it into the worked-out quarry.

A view of the all-concrete storage building for stone, clinker and gypsum. In the foreground are the gypsum crusher and elevator.

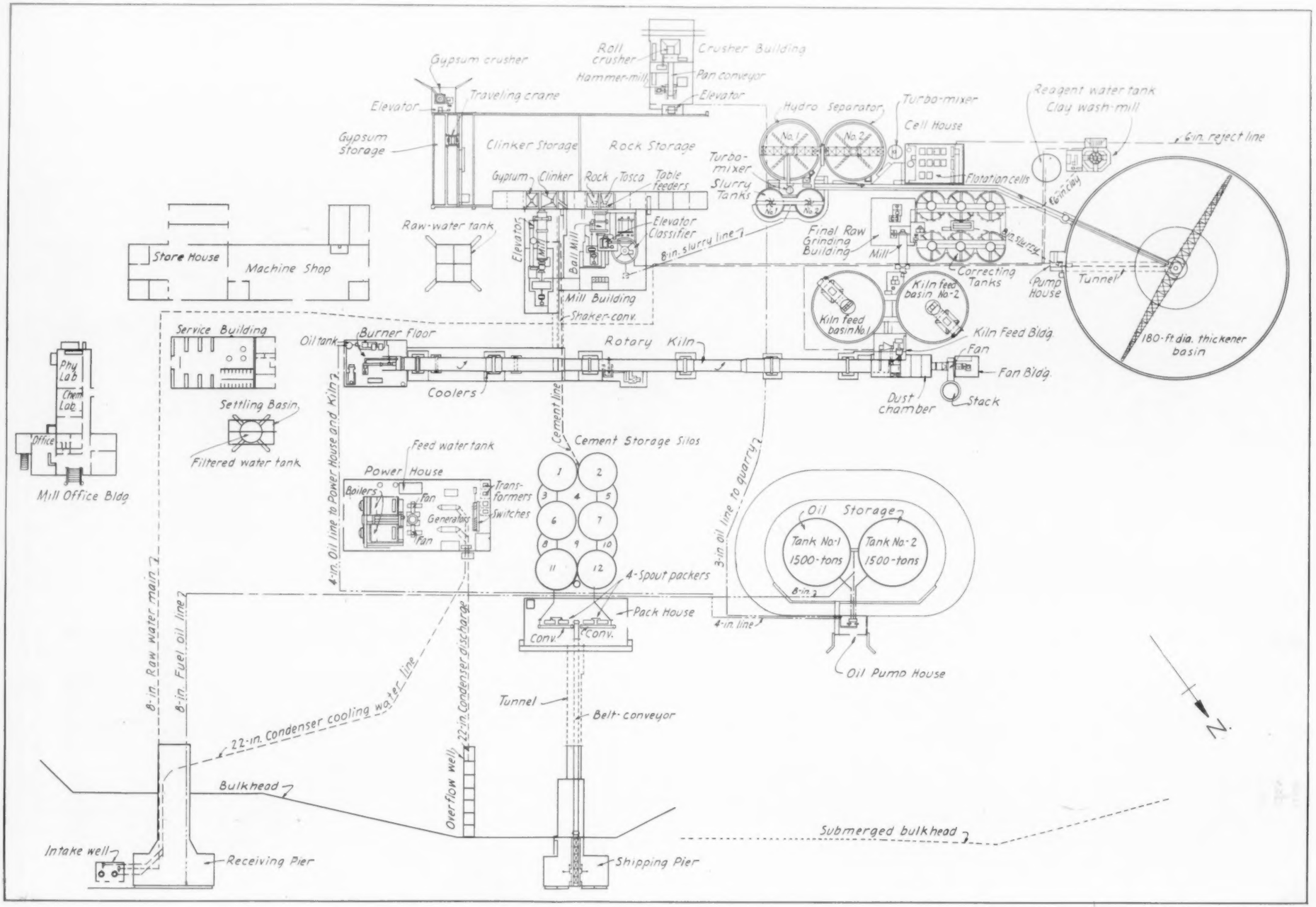


The 400-ft. rotary kiln with dust chamber and kiln feed building at right. Note the concrete piers and walkways with lighting standards for night operation.

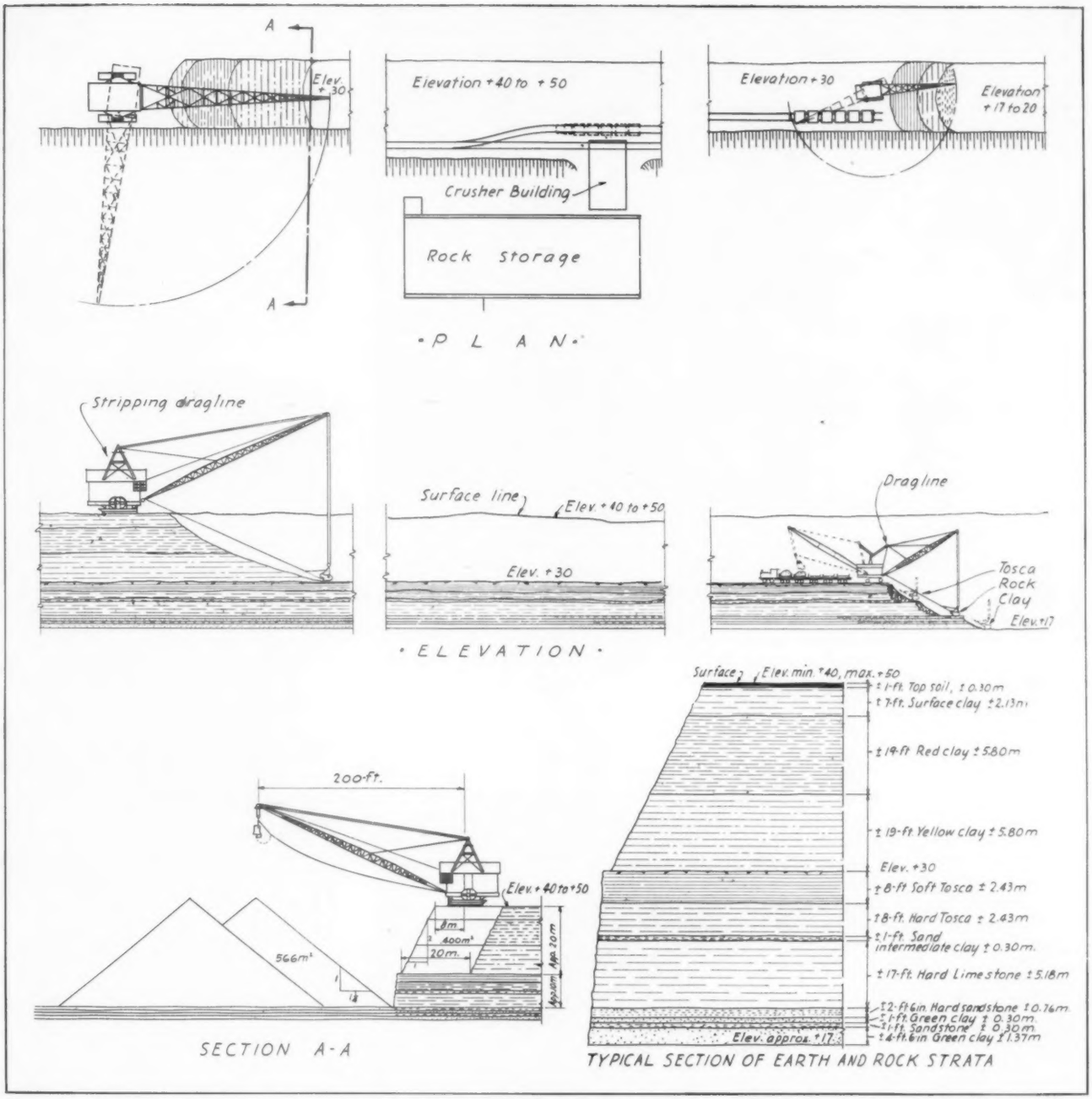
At the crusher building the stone is discharged from the cars by means of a hoist and cable, and the cars are righted by a counterweight. The product of the 36-in. (.91-m.) by 60-in. (1.83-m.) roll-crusher is carried on a pan-conveyor to a 50-in. (1.42-m.) by 50-in. (1.42-m.) non-clogging swing-hammer-mill secondary crusher equipped with moving breaker plates. The minus ¾-in. (19-mm.) product of this mill is discharged to a bucket-elevator which in turn discharges it into the storage building.

This building is used for the storage of rock, clinker and gypsum and is of reinforced concrete like all the other buildings. It is 225 ft. (70.42-m.) long and 75 ft. (23.47-m.) wide and will store 14,000 tons of rock, 38,000 bbl. of clinker, and 4,000 tons of gypsum. This building has a type of roof construction similar to that used in the Lone Star plant at Nazareth, Pa., which was described in the January, 1937 issue of Pit and Quarry. A 75-ft. (22.86-m.) span overhead crane handling a 3-cu. yd. (2.29-cu. m.) clam-shell bucket distributes these materials in the storage and reclaims them to their respective mill-feed bins. These bins are grouped at one side of the building. The roof construction is interesting, consisting of a parabolic arch, 5 in. (127-mm.) thick in the center and 12 in. (305-mm.) at the eaves. The tension rods and the hangar rods are inclosed in concrete as a protection against corrosion.

The gypsum used is brought in by boat and unloaded into trucks. These discharge it into a No. 6 gyratory



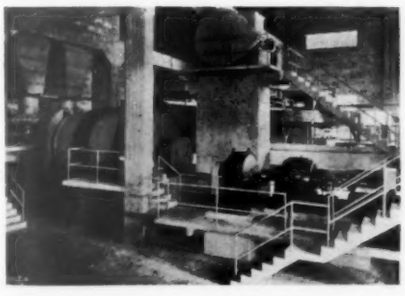
General layout of the plant of the Argentine Portland Cement Co., at Paraná, Argentina.



Quarry layout and elevations showing character of deposit and methods of loading rock and removing and overcasting over-burden into worked-out section of quarry.

crusher. A bucket-elevator discharges the gypsum into the storage building.

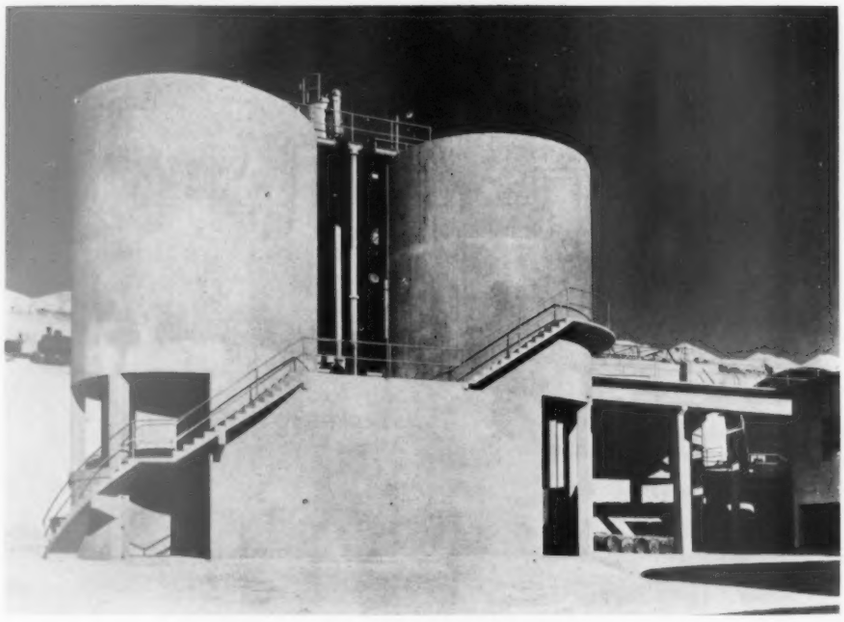
In the storage the low-lime rock is kept separate from the high-lime rock. The crane feeds these two types of rock into their respective bins, from which table feeders make a rough proportioning as they feed the 9-ft. (2.74-m.) by 11½-ft. (3.50-m.) preliminary-grinding ball-mill. A center-discharge bucket-elevator feeds the slurry from this mill to a 20-ft. (6.1-m.) diameter bowl classifier which has a rake 16 ft. (4.88-m.) wide. The rake product is returned by gravity to the feed end of the ball-mill, forming a closed-circuit. The bowl product is delivered by a 5-in. (127-mm.) centrifugal pump into the two storage tanks, which are the first step in the flotation process. This raw-grinding department is designed to deliver the product to the flotation plant just fine enough so that the physical bonds are broken and no unnecessary grinding is done on the silica particles to be removed in the flotation plant.



Interior view showing the preliminary ball mill with feeders at left and the bowl classifier in the background.

The preliminary ground raw material is delivered into the storage tanks of the flotation plant [1] at a fineness of about 88 per cent. through 100-mesh and contains 82 per cent. of water. The tanks are 23 ft. (7.0-m.) in diameter and 23 ft. (7.0-m.) high and are equipped with propeller-type turbo-agitators for keeping the material in sus-

[1] A detailed description of the minerals-separation process used at this plant and of the results obtained will be found on pages 52 to 56 of this magazine.—Ed.



A view of the agitated storage tanks for ball mill slurry which illustrate the artistic use of concrete. Constant-head tank feeding hydroseparators is above.

pension. A 5-in. (127-mm.) pump feeds the slurry from these tanks into a small high-speed hydrofeeder for a final blending before it is discharged by gravity into the first of two 45-ft. (13.72-m.) diameter hydroseparators. The excess slurry overflows the hydrofeeder and is returned to the storage tanks. These are reinforced-concrete tanks and have 6-ft. (1.83-m.) diameter cone outlets.

The overflow of hydroseparator No. 1, consisting mostly of clay minerals, goes directly by gravity into a slurry trough feeding the thickener. The underflow passes by gravity into hydroseparator No. 2, where some additional water is added for more efficient separation. The overflow from this machine also goes to the thickener. The underflow is discharged into a turbo-mixer for final mixing before it goes to the cell-house. This mixer consists of a 10-ft. (3.05-m.) diameter by 15-ft. (4.57-m.) reinforced-concrete tank equipped with a 44-in. (1.12-m.) turbo-mixer agitator. A 4-in. (102-mm.) slurry pump feeds from the mixer to a 4-ft. (1.22-m.) diameter by 5-ft. (1.52-m.) hydrofeeder in the cell-house. In this building are ten 56-in. (1.42-m.) froth flotation cells of which two are held in reserve. The concentrate is discharged from the hydrofeeder into a series of four "rougher" cells. A 4-in. (102-mm.) pump feeds the froth or overflow of these cells to the settling basin or thickener. Another 4-in. (102-mm.) pump feeds their underflow to the four "scavenger" cells. A 4-in. (102-mm.) pump feeds the overflow of these cells to the thickener, and a fourth 4-in. (102-mm.) pump sends the underflow of the "scavenger" cells to waste. The two "cleaner" cells can be used to take the overflow of the "scavengers." In this case their overflow would go to the thickener and their underflow, with the underflow of the "rougher" cells, would go back to the "scavenger" cells. Also, if desired, the original feed can be split to the two sets of four cells each. Almost any desired combination can be made. Each cell has its own reagent feeder for adding fatty acids.

The single-tank pneumatic conveying system which feeds cement to storage silos. Feed tank above reduces loading interval.

The weighing feeders which proportion clinker and gypsum by weight into the finish-grinding mill.

The 10 cells as now used handle the material with approximately the following results, based on 1,000 tons original raw material:

Feed to hydroseparators	998 tons
Fineness	88.95 per cent. thru 100-mesh
Solids in slurry	18 per cent.
Overflow from separators	354 tons
Cell feed	644 tons
Concentrates	401 tons
Rejects	243 tons
Thickener feed	755 tons
Fineness of slurry from thickener	80 per cent. thru 200-mesh

The thickener used for dewatering the concentrate from the cell-house and the overflow of the hydroseparators is 180 ft. (54.86-m.) in diameter and is similar in design to the thickeners in use in a number of cement plants in this country. The water overflowing is transferred by a 6-in. (152-mm.) pump into an elevated reagent-water storage tank of 50,000-gal. (190 000-liter) capacity. This water is used continuously for addition to the flow at the bowl classifier, the hydroseparators, or the cells, as required. This is an economy, as this water contains some reagent and its use also saves the cost of pumping in fresh water.

The cell house in foreground with hydroseparators and storage and crusher buildings in background. At the left is the launder carrying hydro-separator overflow and flotation concentrates to the thickener.

The final product from the underflow of the thickener contains about 38 per cent. of water. A 4-in. (102-mm.) pump feeds this material to a distributing box, from which it can be discharged into five of the six correcting tanks. The sixth tank contains clay slip. These tanks are of reinforced concrete and are 23 ft. (7.0-m.) in diameter and 23 ft. (7.32-m.) deep. They are equipped with mechanical-and-air agitators. A rotary compressor supplies air at 50-lb. (22.7-kg.) pressure for agitation.

The contents of these tanks are analyzed every hour as they are being filled and again when they are full. The mixture is withdrawn from these tanks

to give the correct chemical composition. A slow-speed center-discharge bucket-elevator feeds the material to the final raw-grinding tube-mill. The pit of this elevator is used as a sump and any overflow returns into it. The rate of feed to the mill is regulated by the speed of the elevator.

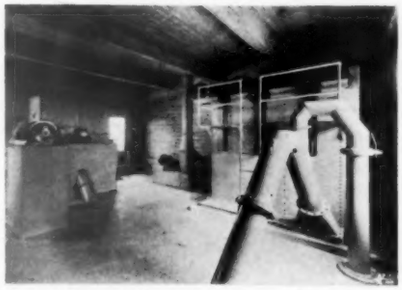
This mill is 7 ft. 2 in. (2.2-m.) in diameter by 26 ft. 3 in. (8.0-m.) long and has one partition which keeps the charge separated in two compartments. Slotted rings lift the balls to improve the grinding efficiency. The first 7-ft. 10-in. (2.4-m.) compartment contains 4 tons of 1-in. by 1-in. (25-mm. by 25-mm.) Cylpebs and 7 tons of ⅞-in. by ⅞-in. (22-mm. by 22-mm.) Cylpebs. The second compartment, which is 16 ft. 5 in. (5-m.) long, is loaded with 13 tons of ⅞-in. by ⅞-in. (22-mm. by 22-mm.) Cylpebs and 10 tons of ¾-in. by ¾-in. (19 mm. by 19-mm.) Cylpebs.

The slurry is discharged from this mill at a fineness of 95 per cent. through 200-mesh into the sump of a bucket-elevator, which feeds it to two concrete kiln-feed mixing basins, each 56 ft. (17.07-m.) in diameter and 25 ft. (7.62-m.) high. Each basin has a revolving

The air separator which is used in closed-circuit with the finish-grinding mill. Fan is in foreground and duct at left above leads to cyclone.

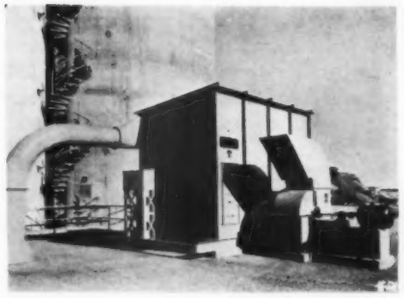
slurry agitator of Lone Star's own design. This agitator consists of an arm revolving about a center pier in the tank and running on a rail about the circumference of the tank. At the center of this arm is a separately-driven revolving agitator. A 6-in. (152-mm.) pump is used to transfer the slurry from one tank to the other or to transfer slurry from the bottom to the top of either tank. This system prevents segregation in the slurry before it is fed to the kiln and insures a uniform blend. From these basins the slurry is fed to the spiral-scoop kiln feeder by another sump and elevator. The above 6 in. (152-mm.) pump can also be used to feed slurry direct into the kiln feeder in case of a breakdown of the elevator. The feeder is synchronized with the driving mechanism of the kiln by means of a generator on the kiln-motor drive-shaft. Provision is made for changing the ratio, but any necessary adjustments are usually made in the burning. Any overflow from this feeder goes back to the mixing basins.

The kiln is 400 ft. (121.92-m.) long and has seven floating-type tires supported on single ball-and-socket type water and oil-lubricated and cooled rollers. The kiln is 10 ft. 11½ in. (3.34-m.) in diameter for 125 ft. 11 in. (38.39-m.) at its feed end. In 4 ft. 11 in. (1.50-m.) it then tapers to a diameter



The bag-type dust collector which is connected to vital points in the finish-grinding department.

of 9 ft. 11½ in. (2.92-m.) for 144 ft. (43.95-m.) of its length. Another tapered section 4 ft. 11 in. (1.50-m.) long is followed by the burning section, which is 115 ft. 4 in. (35.15-m.) long and 10 ft. 11½ in. (3.34-m.) in diameter. A set of slurry-drying chains 80 ft. (24.38-m.) long is installed at the feed end of the kiln with a standard louvre damper and induced-draft system. The kiln is lined in accordance with accepted standards, and 2½ in.



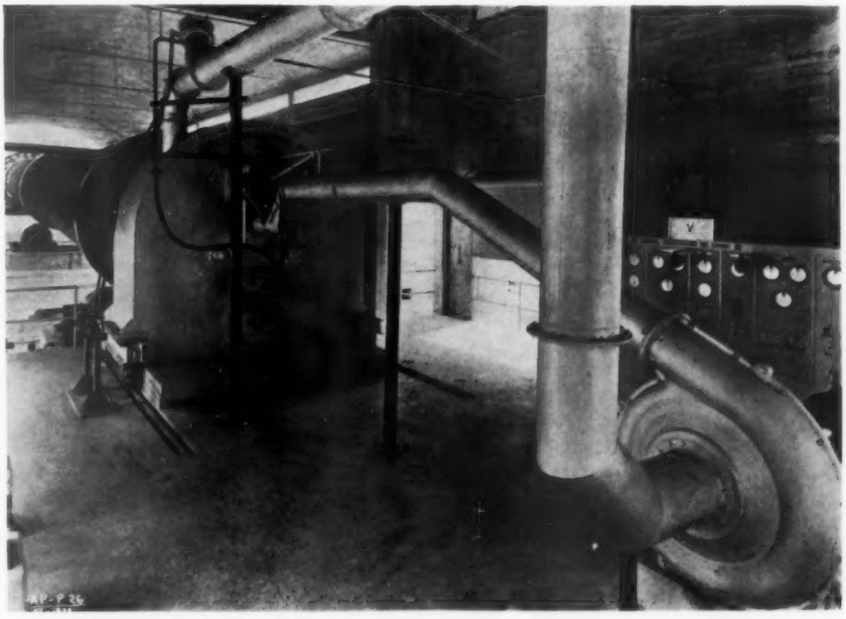
The bag-type dust collecting system which keeps the pack-house dustless. Note typical neatness of design.

(65-mm.) of insulation is used between the lining and the shell. It is driven by a 140-hp. d.-c. motor through gear reduction and a spring-supported drive gear.

With the slurry containing 42 per cent. of water this kiln produces up to 3,000 bbl. of clinker per day, with a fuel consumption of 1,000,000 B.t.u. per bbl. The kiln-gas exit temperature is kept under 400 deg. F.

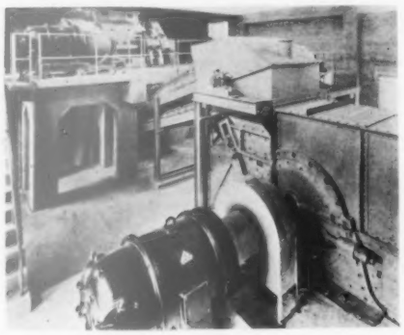
This kiln is equipped with a multiple gas-discharge system by means of which the gases pass from the kiln through special outlets in the shell into the dust-chamber. This system insures against slurry spillage out of the back end of the kiln. The dust-chamber is a steel housing about 48 ft. (14.5-m.) long, 18 ft. (5.2-m.) wide and 31 ft. (9.5-m.) high from the ground-line. It is lined with firebricks. A rope-tightening device insures constant and complete air-tightness between the kiln and the dust-chamber. An exhaust fan controlled from the burner floor discharges the gases into a reinforced concrete stack 9 ft. (2.74-m.) in diameter and 110 ft. (33.53-m.) high.

The dust settled in this chamber is



The kiln burner platform which is notably free from obstructions. Even the clock on the control panel at right is ultra-modern.

collected by a screw-conveyor to a cross screw-conveyor followed by an elevator which discharges it into a bin over the kiln-feeder floor. A screw under this bin feeds the dust through a side opening into a circular pot through which the slurry passes from the feeder into the kiln. The slurry enters tangentially, creating a whirling action which



Interior of crusher building with hammermill in foreground and roll crusher and pan conveyor in background.

thoroughly mixes the dust with the slurry.

The control board for this kiln is identical with the many boards installed in cement plants in this country and described in various issues of PIT AND QUARRY in recent years. The equipment includes thermometers, electric pyrometers, electric CO_2 and COH_2 measuring equipment, draft gages, a primary-air gage, an electric thermometer and a siren for dust-chamber gases to protect the chains, oil-flow meters, switches, etc.

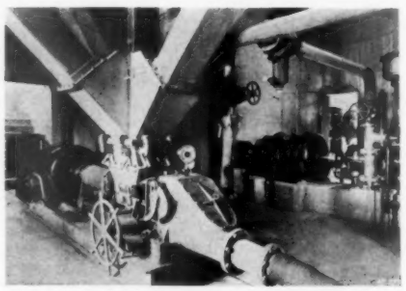
The clinker is discharged from the kiln directly into the 9-ft. (2.74-m.) by 120-ft. (36.58-m.) rotary cooler, which is carried on two tires. For the first 40 ft. 4 in. (12.3-m.) of its length the cooler is lined with firebricks and has lifters or flights throughout a distance of 3 ft. 3 in. (1-m.) at the inlet to prevent any overflow. Then for a distance of 35 ft. 5 in. (11.4-m.) there are steel-channel lifters followed by 37 ft. 9 in. (11.5-m.) of lifters and quadrant plates. The clinker drops from this last section into an integral circumferential retainer of greater diameter than the remainder of the cooler. Lifters in this retainer discharge the clinker at an elevation near the center of the cooler and eliminate the necessity for a pit for the clinker-conveying mechanism. The cooled clinker has a temperature of about 100 deg. F. A reciprocating conveyor 16 in. (400-mm.) wide and 124 ft. 8 in. (38-m.) long carries the clinker to a bucket-elevator which discharges it into the clinker storage.

Clinker and gypsum are handled by the overhead traveling crane into their respective mill-feed bins. Automatic belt- and pan-conveyor constant-weight feeders discharge the desired blend of clinker and gypsum into the 8-ft. (2.44-m.) bv 40-ft. (12.19-m.) finish-grinding combination mill. This 4-compartment mill is loaded with 74 tons of steel balls and Cylpebs. It is supported on one trunnion bearing and a slide-shoe bearing of a type which has been completely described in previous articles. The mill is connected to an air-separating system, but is so arranged that it can operate in either open- or closed-circuit. Provision is made for water-cooling the mill when operating in open-circuit by means of a spray casing around the mill shell. This keeps the temperature below the point where moisture would accumulate and coat the grinding medium.

The air-separating system consists of a separator, fan and cyclone. In this installation the product of the fourth compartment of the mill is discharged to a series of two screw-conveyors feeding a bucket-elevator, which feeds the separator. The tailings from the separator are returned to the feed end of the mill through a control valve. The separator fines are blown from the separator by the draft from a fan into a cyclone which settles out the finished cement. This same fan draws the air from the cyclone and recirculates it through the system. In this way none of the extremely fine cement is lost.

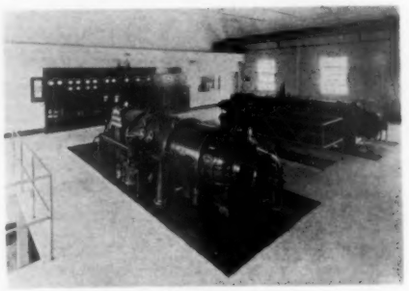
The finished cement is discharged from the cyclone through a control valve into a 71-cu. ft. (2-cu. m.) capacity single-tank pneumatic conveying system. A small bin above the tank takes the cement feed when the pump is unloading and reduces the charging interval. Air for this conveying system is supplied at 60-lb. (27.24-kg.) pressure by a rotary compressor. The cement is discharged into storage consisting of six reinforced-concrete silos 32 ft. (9.75-m.) in diameter and 82 ft. (25-m.) high, arranged in two rows. These with their interspaces have a total capacity of 124,000 bbl.

Cement is reclaimed from these silos through 14-in. (356-mm.) rotary valves



One of the two 7-in. pneumatic pumps which reclaim cement from silos. Rotary air compressor is in background.

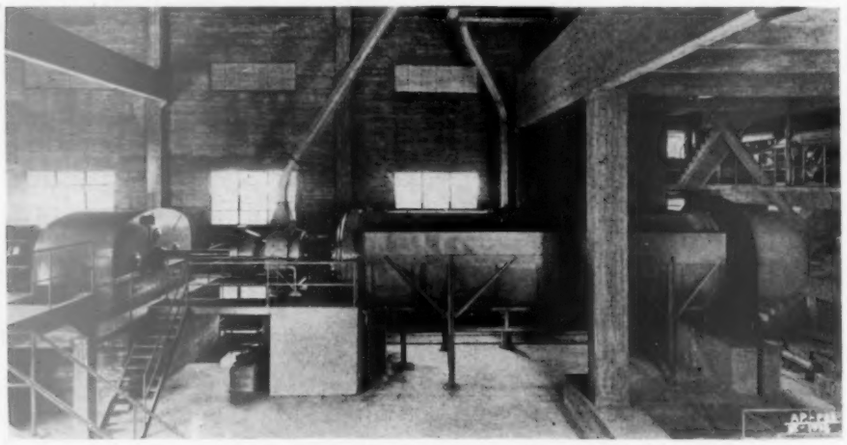
at 38 openings by means of two 7-in. (178-mm.) pneumatic pumps mounted on carriages running on rails. These can be moved to reclaim cement from any of the silos and are connected to the pipe-line to the pack-house by flex-



The main turbo-generator room in the powerhouse. Shown are the two 2,500 kw. sets and the switchboard.

ible rubber hose. Compressed air for these pumps is supplied by two rotary compressors driven by 100-hp., 750-r.p.m. auto-synchronous motors. Each motor-compressor shaft is extended to an exciter for the motor.

Cement is delivered from the pipe-line into bins over four 4-spout bag-packers, which are on the second floor of the pack-house. Two 9 in. (229-mm.) screw-conveyors collect the spillage from these packers and feed two 4-in. (102-mm.) pneumatic pumps



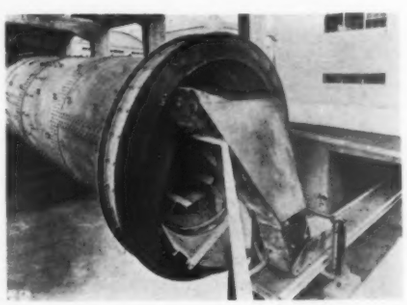
The finish-grinding tube mill with casing for spray cooling. Pipes to and from closed-circuit air-separating system are above.

The combination office and laboratory building which is air-conditioned and modern in every way.

The interior of the physical testing laboratory which is completely equipped but not overcrowded.

which return this material into the bins. The sacked cement from each pair of packers is discharged on a belt-conveyor. These belts are run in opposite directions to the sides of the pack-house for loading trucks. When loading boats, these conveyors are reversed and both discharge on a 42-in. (1.07-m.) wide belt-conveyor, which is inclined downward to the floor below. There the sacks of cement are discharged on a belt-conveyor 140 ft. 5 in. (42.8-m.) long, which carries them to the dock. A 39 ft. 9 in. (11.8-m.) long boom belt-conveyor discharges the sacks into the barge or boat being loaded. The boom conveyor can be raised or lowered to compensate for a tidal range of 16 to 20 ft. (5- or 6-m.).

As no reliable supply of central-station power was available, a high-pressure steam-generating station was decided upon as the most efficient method under existing conditions. This station contains two water-tube boilers designed for a normal capacity of 10 metric tons of steam per hour at 29 atmospheres absolute pressure and at a steam temperature of 400 deg. C. These boilers are equipped with primary and secondary economizers, air-preheaters, etc., are designed for oil-burning and have an efficiency of 86 per cent. at normal load. A single steel stack serves both boilers.



The discharge end of the cooler with lifters which discharge clinker to reciprocating conveyor.

The generating equipment consists of two turbo-generators of the radial-flow, double-rotating type. Each generator is rated at 2,500 kw. and is equipped with all the modern auxiliaries for effective control and economical operation, such as a voltage regulator, an exciter, an air-cooling system, etc. Under normal conditions this station produces 1 kw.-hr. on the switchboard with a fuel expenditure of 18,000 B.t.u. The 2,300-v. current generated is used for the motors operating the mills, crushers, draglines and kilns. This is reduced to 420 v. for smaller motors and 220 v. for lighting. The total connected motor load amounts to 5,040 hp., and at full yearly operation the load factor in relation to the connected load will be about 50 to 60 per cent.

The oil used as fuel throughout this plant is delivered by tank steamers, from which it is pumped into two 1,500-ton steel storage tanks. These are mounted on concrete bases in a depression near the plant and detract nothing from its artistic appearance. Oil is pumped from these tanks to a supply tank on the kiln-burner floor. The oil is then heated by steam before being fed by a constant-pressure pump to the burner. A fan draws some hot air from the kiln hood for injection through the burner. The kiln firing hood is of standard design and is fitted with air seals.

Every effort is made to keep this plant as clean and safe as any other industrial plant. The finish-grinding department is connected at all vital points to a bag-type dust-collector. There is another dust-collecting system at the pack-house.

The office and chemical and physical laboratories are in a building designed for maximum comfort during the hot summer months. The laboratories are fully equipped to make all the necessary analyses and tests.

Earth Vibrations Due to Quarry Blasting

Valuable information on the causes and effects of earth vibrations due to the firing of blasts in quarries has been obtained as the result of a study made by the Bureau of Mines, Department of the Interior. The problem is of considerable importance in numerous communities where damage to buildings has occurred, allegedly due to such blasts.

In order to ascertain the possible effect of certain variable factors present in all quarry tests, experiments were made by the Bureau of Mines in an underground limestone mine in which conditions could be controlled with more precision.

These mine tests were designed so that many of the variable factors present in quarry blasting could be eliminated entirely or their effects closely evaluated. Tests and results were as follows:

Holes drilled to break gave less vibration than those drilled blind with too great a burden to break. This indicated that for comparison all shots must be made in holes that do not break.

In all tests it was impossible to distinguish between tamped and untamped holes as measured by the vibrational effect.

Change of shape of explosive charge had no effect on the seismic wave.

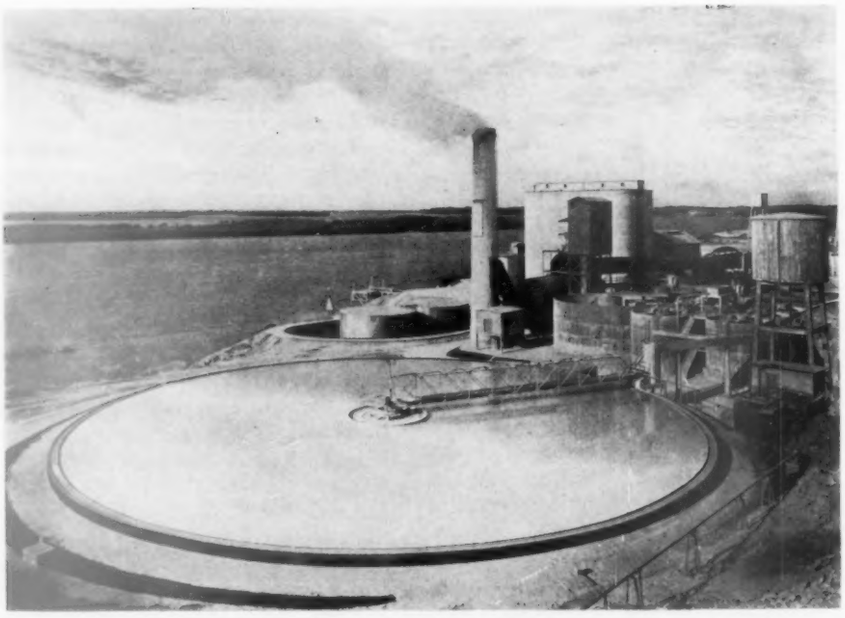
Shots made in isolated pillars gave frequencies, amplitudes, and speed of propagation similar to those made in a rib continuous to the recording station. There was evidenced, however, a decided difference in the shape of the waves recorded.

Huge Blast Detonated at Monocacy, Pa., Quarry

A tunnel blast was made on Sept. 14 at the Monocacy, Pa. quarry of the John T. Dyer Quarry Co., which brought down nearly 400,000 cu.yd. of rock. According to officials of the company, it was a very successful blast, and the results were highly satisfactory both as to yield and fragmentation. Other shots of equal size have been made at this quarry in recent years, and one in 1937 brought down over 1,000,000 tons of rock with 88 tons of explosive.

Preparations for this shot had been going on for nearly a year. One tunnel was driven 60 ft. into the face of the quarry and had one lateral 70 ft. long and another 80 ft. long. Tunnel No. 2 was driven parallel to No. 1 to a depth of 60 ft. and had a right-hand lateral 180 ft. long. These tunnels were loaded with a total of 38,000 lb. of du Pont Nitramon. In addition 14 well-drill holes 130 ft. deep on the 265-ft. high face were loaded with 17,500 lb. of 60-per cent. du Pont gelatine free-running Red Cross and du Pont Extra A. These holes were tamped down for 36 ft. from the top with screenings. The holes and tunnels were detonated simultaneously from the plant power-line with Primacord and electric blasting caps.

The shot was laid out by E. T. Wolf, sales representative and technician, and Sam Thair, technician, both of the du Pont company, who also supervised the shooting. Mr. Wolf also supervised the shot made in 1937.



LEFT: A general view showing the thickener, the kiln-feed storage tanks, the fuel oil storage tanks, and the water storage tank and cell house at extreme right. BELOW: Interior view of cell house with rougher cells and their feed tank in center row, scavenger cells at right and cleaner cells at left. Reagent feeders are visible in back of each cell motor. Note concentrates overflowing cells.

Minerals-Separation Process Used at Lone Star's New Argentina Plant

ADVANCED methods for the preparation, and both chemical and physical control, of its raw-material composition, were directly incorporated in the original design of the new plant of the Argentine subsidiary of the Lone Star Cement Corp. (Cia. Argentina de Cemento Portland). Although several other new cement mills are now utilizing the Breerwood process, this was the first plant specifically designed to take full advantage of its possibilities, unhampered by the limitations of existing equipment and its arrangement. The entire raw-material flow-sheet, from the quarry to the kiln-feed tanks, presents an unusual and ingenious combination of grinding and minerals-separation methods and equipment appropriate to the materials available at the plant site.

The complete plant is described elsewhere in this issue.[1] It is located at Paraná on the Paraná River, in the Province of Entre Rios. The location is especially favorable with respect to transportation facilities and proximity to large markets, including Buenos Aires, and its selection may largely be attributed to the results of preliminary flotation tests, which demonstrated that satisfactory compositions for all known types of cement could be derived from materials available at the site, and without additions of materials from other sources.

After almost a year of successful operation, without substantial incident, the principal results, and the conclusions that can be drawn from them, can be summarized briefly as follows:

Cements of high quality and strength characteristics and of extraordinary uniformity have been produced with this process from compositions derived solely from a deposit which otherwise would have been impossible. The provisions for relatively simple adjustments in the operation of the plant make it possible to vary the ratios and moduli for the production of all known types of cement, including those which would satisfy the most rigid specifications for sulphate-resisting cements. The processing method reduces both soluble and insoluble alkalies, the clinker produced being almost entirely free of alkali. By recovering substantially all the available lime and the useful proportions and varieties of clay minerals the process assures the plant of a practically inexhaustible supply of raw material. The combination of the grinding and minerals-separation methods has resulted in a corrected kiln feed averaging about 90 per cent. minus 325-mesh, this high fineness resulting in a composition free from segregation and of excellent burning characteristics. This high fineness is reached economically by eliminating the excessive proportion of coarse quartz prior to the final grinding of the necessary minerals, reducing thereby the total power consumption of the two mills to the minimum. The clinker is hard-burned but is easily ground, a characteristic at least partly attributable

[1] See pages 40 to 51.

to the uniformity of the composition and its fineness.

Quarry.—The entire raw-material supply is adjacent to the plant and may be described as a consolidated marl, the two principal strata being quite hard, with the lowermost distinctly recrystallized. The four major horizontal strata are in the order of: overburden clay; a soft, lime-bearing material known locally as soft Tosca; a somewhat harder stratum of similar material, known as hard Tosca; and a crystalline limestone

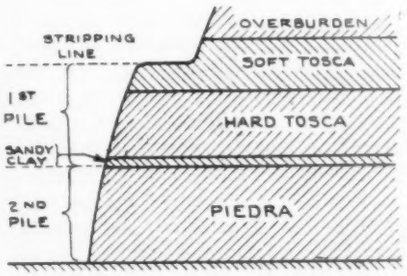


Fig. 1

known as Piedra, the present development, and the method of working, being illustrated schematically in Fig. 1. The average analyses of the strata are about as follows:

	Overburden Clay %	Soft Tosca %	Hard Tosca %	Piedra %
SiO_2	68.08	66.30	19.48	9.68
R_2O_3	20.20	17.72	4.16	0.84
$CaCO_3$	2.70	5.17	71.90	89.30
$MgCO_3$	....	1.75	4.34	2.61
SiO_2-R_2O_3 ratio	3.31	3.74	4.68	11.52

The necessity for employing a minerals-separation method to correct the chemical composition of each of these strata or any combination of them will be evident. The Piedra is higher in lime than required, but contains practically no iron and alumina. The silica content is misleading as it occurs mostly as coarse quartz and is therefore undesirable as a constituent of the mixture. The other lime stratum, the hard Tosca, is too low in lime and considerably excessive in silica, the SiO_2-R_2O_3 ratio being 4.68, a large proportion of the silica being in the form of coarse quartz grains. The soft Tosca, which is used as the source of clay minerals, must be corrected by subtracting a part of the silica, since its natural SiO_2-R_2O_3 ratio is 3.74. Even the overburden clay could readily be used if a small proportion of the silica were removed.

The present method of quarrying the material comprises stripping and discarding all the overburden clay and about half of the soft Tosca, the remainder of the deposit being utilized. To simplify the operation of the process plant and to avoid frequent adjustment of the units, two cuts are made, the useful part of the soft Tosca together with the hard Tosca being sent to storage and kept in a pile separate from the Piedra. From these two piles the materials are delivered by the crane to two bins above the ball-mill and are proportioned by separate feeders in direct relation to the thickness of the strata, a relatively uniform material mixture being sent to the process plant, averaging about as follows:

SiO_2	28.70 per cent.
Fe_2O_3	2.57 per cent.
Al_2O_3	4.01 per cent.
CaO	33.35 per cent.
$CaCO_3$	59.50 per cent.
MgO	1.25 per cent.
Loss	29.69 per cent.
Total	99.55 per cent.

SiO_2-R_2O_3 ratio 4.36

Petrographic examinations of the materials, which comprised an essential part of the preliminary minerals-separation investigations, identified the principal component minerals as calcite, quartz, aluminum silicates, limonite, and dolomite. The aluminum silicates comprise the alkali feldspars, soda plagioclase (Albite) and potash feldspar (Microcline) and hydrous aluminum silicates of indeterminate composition approaching clay minerals and ranging in size from one to several microns. The mineralogical equivalent of the above analysis is, accordingly, approximately:

Quartz	24.40 per cent.
Limonite	3.14 per cent.
Aluminum silicates	9.78 per cent.
Calcite	59.75 per cent.
Dolomite	3.01 per cent.
	100.08 per cent.

A thorough preliminary investigation of these materials was made to determine whether or not they would respond satisfactorily to minerals-separation methods before the plant site was finally selected. The principal test work comprised determinations of grinding, classification and thickening characteristics together with investigations of the amenability of each of the materials, their fractions according to particle size and mixtures of them, to froth-flotation concentration. The test data served as the basis in designing the flow diagram and for the selection of the various units of the process plant. This work was done by the laboratory of the Separation Process Co., Catasauqua, Pa., with the coöperation of

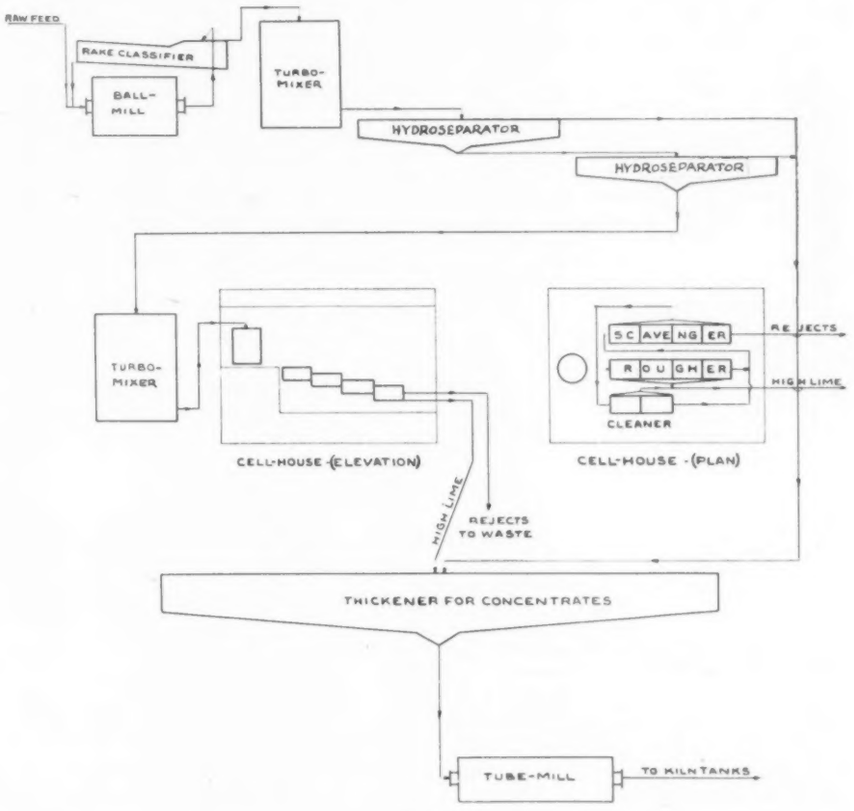


Fig. 2

laboratories of the Dorr Co., Inc. and the American Cyanamid Co.

To make the essential corrections of these materials the objective of the process plant is principally to recover substantially all the calcium carbonate and the useful fine clay minerals, but to

The two hydraulic separators and the two slurry tanks in the foreground with the reagent water tank, the cell house and the thickener in the background.

subtract and discard the excessive proportion of silica in the form of coarse quartz grains, and without attempting to grind the latter, and to control the proportion of alumina for the production of low-heat and sulphate-resisting cements.

Prior to storage the materials are crushed to minus ¾-inch ring in a Fairmount roll-crusher and a hammer-mill, and are stored in the two piles described above. Preliminary grinding of the proportioned materials is accomplished in a single 9-ft. by 11½-ft. ball-mill in closed circuit with a bowl classifier. This operation differs from usual preliminary grinding since it is the purpose to reduce the materials only to a degree at which the coarse quartz is physically released, whereby it may be subtracted from the calcite and useful clay minerals in the flotation operation. Mineral-bond breakage is complete at 85 per cent. minus 100-mesh, further grinding at this point being undesirable as it would involve a waste of power and otherwise increase operating costs.

A brief reference to the flow-sheet (Fig. 2), and a plan illustrating the arrangement of the principal units of equipment (Fig. 3), will simplify the description of the functions of individual units of the process plant. The overflow of the bowl classifier is sent to two 7-m. by 7-m. turbo-mixers, shown in the plan, which act as slurry-storage tanks and surge tanks to keep the solids in suspension until they are fed to two 45-ft. hydroseparators connected in series. Substantially all the fine calcium carbonate and the necessary proportions of the fine clay minerals are recovered as the overflow of the two hydroseparators. The underflow from the second hydroseparator is largely calcite and coarse quartz, evidently of sea-sand origin, and is fed to the flotation cells, where the quartz is rejected and pumped to waste. The calcium-carbonate concentrate is fed to a 180-ft. thickener, where it joins the fine calcium carbonate and clay minerals, *i.e.*, the overflow from the hydroseparators. The mixture, after being dewatered and ground in open-circuit to proper fineness in a 7-ft. by 26-ft. tube mill, constitutes the kiln feed.

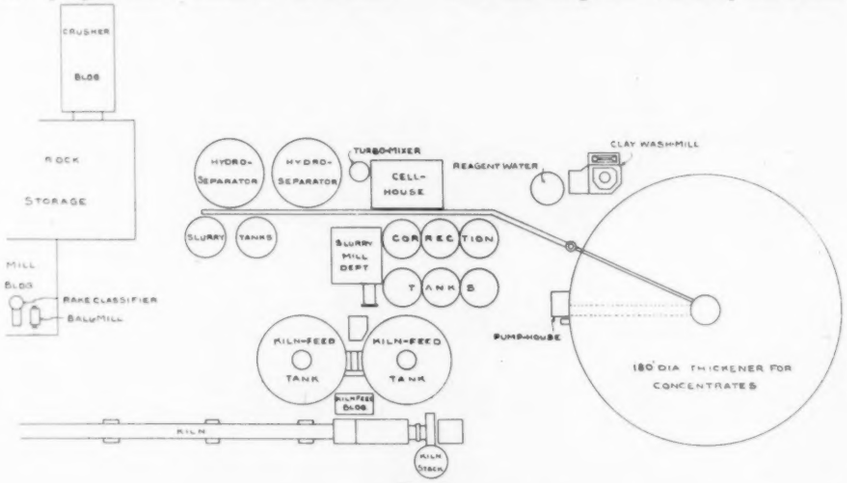


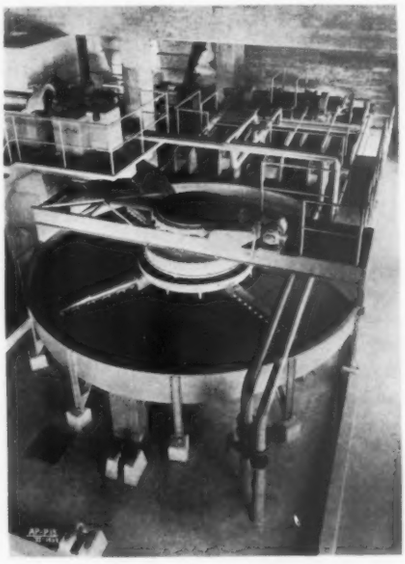
Fig. 3

Hydroseparation.—As the proportion of alumina in the natural materials is reduced in the normal operation of the process plant, and there are substantially no undesirable minerals—other than the excessive proportion of coarse quartz, which occurs widely distributed throughout the deposit, including the clay—the removal of the coarse quartz and the reduction of the silica ratio constitutes the principal function of the flotation cells. Elutriation and analysis showed that there was sufficient clay minerals in the quarried material, and that the clay itself were not suitable for cement making, unless a large proportion of silica was removed. The simplest plan was, therefore, to combine the materials prior to preliminary grinding and to follow this with a series hydroseparator operation to provide for satisfactory and efficient classification. Control of the hydroseparator operation was determined to be the most economical and satisfactory method both for recovering the fine constituents of all the useful minerals, and for proportioning their tonnage, relatively to the tonnage of the coarser fractions from which the quartz is subtracted by the flotation operation. Similarly, this control is a convenient method of proportioning, when it is desired to adjust the proportion of alumina in the kiln feed, the alumina being a constituent remov-

The 5-cu.yd. electric dragline loading rock into cars. Note the character of the raw material which makes this method of loading possible.

able by eliminating proportions of aluminum silicates during flotation.

Hydroseparation of the overflow of the bowl classifier has, accordingly, a number of advantages, both with relation to the chemical characteristics of the composition and the operating economy of the plant. The removal of the fine calcium carbonate and the necessary quantities of clay minerals, as hydroseparator overflow requiring no further treatment than combination with the high-lime concentrates of the flotation cells, limits the quantity of material that must be treated by froth flotation to make the necessary chemical corrections. Thus, the coarse fractions only, representing from 60 to 65 per cent. of the total quarried materials, must be treated by flotation, the excessive proportion of quartz being sub-



The bowl and rake classifiers in the raw-material grinding department. In left background are table feeders, preliminary raw mill and elevator to classifier.

tracted without wasting the disproportionate amount of grinding power that would be necessary to reduce it to normal kiln-feed fineness, and its removal prior to final grinding has obvious advantages in mill economy. As the coarse product, forming the underflow of the second hydroseparator, comprises largely calcite and quartz, the limited tonnage requires less equipment for flotation and simplifies that operation, as well as limiting the consumption of flotation reagents.

The increased fineness resulting from the elimination of the quartz prior to the final grinding is illustrated by the results of six-months operation, during which the ball-mill grind averaged 88.95 per cent. minus 100-mesh. The thickener underflow shows an increase in fineness to 80.0 per cent. minus 200-mesh. This thickener underflow is easily reduced to kiln-feed fineness of approximately 90 per cent. minus 325-mesh in a simple open-circuit grind in the 7-ft. by 26-ft. tube-mill with low power consumption.

Reference to the chemical analyses of the hydroseparator feed and the analyses of the overflow and underflow, given below, will show how completely the clay and fine calcite are recovered, and it will be understood that all the coarse quartz is discharged in the underflow of the second separator, from which it is ultimately removed as the principal flotation reject. It will also be seen that the SiO_2-R_2O_3 ratio of the feed is 4.36; that of the overflow from the first separator 2.70; that of the overflow from the second separator 2.82; and that of the underflow from the latter, and which constitutes the flotation-cell feed, is 5.85. As some of the calcium carbonate is ground to about the same fineness as the clay minerals, and is recovered in the hydroseparator overflow and sent to the thickener without further treatment, it will be understood that the flotation-cell feed comprises only about 60 to 65 per cent. of the materials quarried and sent to the plant, but that a sufficient quantity of high-lime concentrates can be derived from this limited proportion to make the final correction of composition.

It is necessary to control the dilution of the feed to each hydroseparator and to give both separators a uniform flow of solids. This is done by using a feed tank with a constant head and by discharging through an orifice. Check tanks installed on each hydroseparator make it possible to determine tonnages and dilutions at all times. Separate water-lines are provided on each separator to correct dilutions, if necessary. The average analyses of the feed and classifier products are as follows:

	Hydro-separator Feed	Hydro-separator No. 1 Overflow	Hydro-separator No. 2 Overflow	Cell Feed
SiO_2	28.70%	24.00%	24.64%	30.88%
Fe_2O_3 ...	2.57	2.95	2.75	2.36
Al_2O_3 ...	4.01	5.93	5.97	2.92
CaO	33.35	33.32	32.52	33.52
$CaCO_3$ ..	59.50	59.48	58.08	59.85
MgO ...	1.25	1.78	2.03	0.90
Loss	29.69	31.46	31.24	28.72
Total ...	99.55%	99.44%	99.15%	99.30%
SiO_2-R_2O_3 ratio ..	4.36	2.70	2.82	5.85

Flotation-Cell House.—The principal equipment of the cell-house comprises a turbo-mixer, used both as a surge tank and for storage, an agitated feed tank, and ten 56-in. flotation cells.

The actual flotation operation includes three distinct steps, namely "roughing", "scavenging", and "cleaning". The cell feed is delivered from the turbo-mixer to the agitated feed tank, which delivers material averag-

The thickener-overflow pump driven through V-belts from motor above. Pressure booster pump is at left.

ing about 59 per cent. $CaCO_3$, at an average dilution of about 28 per cent. solids, to the first of four "rougher" cells connected in series. The concentrates from these cells are high in lime and require no further treatment. The tailings from these cells include too much calcite to waste and they are, accordingly, submitted to a second operation, constituting the feed to four "scavenger" cells likewise connected in series. The scavenger concentrates are of relatively low grade and are, therefore, the feed to the first of two "cleaner" cells, in series, the cleaned concentrates being combined with those of rougher flotation. The tailings of the second "cleaner" cell are added to the feed to the "scavenger" cells, *i.e.*, the "cleaner" cells are in closed-circuit with the "scavenger" battery. The tailings of the last "scavenger" cell are the final rejects of the plant and are pumped to waste. Good metallurgical results are obtained by proportioning the quantities of the reagents fed to the "scavenger" and "rougher" cells, and by controlling accurately the dilutions of the feed to each group of cells, the latter being accomplished by the agitated feed tank which provides a constant head, and which is discharged through an orifice.

The grade of the flotation concentrates and the weight recoveries are under complete control and are kept uniform, so that simply by properly proportioning the tonnage fed to the flotation cells, with relation to the hydroseparator overflow, inversely as the $CaCO_3$ content of the quarried material changes, the mixture of the overflow with the concentrates in the thickener is maintained at the desired kiln-feed composition. Operated in this manner, the process plant serves to produce a continuously-corrected kiln feed, thoroughly mixed and blended by the natural action of the thickener, prior to final grinding. The principal flotation control is effected by feeding the proper quantity of calcite-collecting reagent to each cell of the flotation cir-

cuit, each cell being equipped with an adjustable reagent feeder.

A novel, highly-efficient reagent, developed jointly by Separation Process Co. and the American Cyanamid Co. and known as "Cyanamid 608", is used to concentrate the calcite. This reagent can be diluted in cold water and quickly dispersed in the flotation pulp under accurate control of quantities introduced at each stage, and requires no additions of frothing agent. The total reagent consumption for the flotation plant is about 0.5 lb. of "Cyanamid 608" per ton of cell feed, costing .65c. (6½ mills) per bbl. of clinker.

The overall efficiency or lime recovery of the process ranges from 97 to 98 per cent., the quartz rejects being very low in lime. The following typical analyses illustrate the finished products of the flotation cells:

	Cell Feed	"Rougher" Concentrates	"Cleaner" Concentrates	Combined Concentrates	Rejects
SiO_2	30.88%	3.44%	3.00%	3.37%	75.68%
Fe_2O_3	2.36	0.57	0.78	0.60	3.90
Al_2O_3	2.92	0.31	0.30	0.30	5.90
CaO	33.52	53.87	53.87	53.87	5.18
$CaCO_3$	59.85	96.20	96.20	96.20	9.24
MgO	0.90	0.32	0.55	0.34	1.05
Loss	28.72	41.22	40.96	41.05	9.40
Total	99.30%	99.73%	99.46%	99.53%	101.11%
Ratio	5.85	3.91	2.78	3.74	7.71

Control of Raw Mix.—The original method of operating the process plant was purposely planned to provide for a factor of safety in making the final correction of the mixture prior to burning. To this end, the thickener underflow was controlled to be 1 per cent. higher in lime than necessary. The underflow was then pumped to the correction tanks, where sufficient clay slurry, from a clay wash-mill, was added to correct the lime to the proper proportion, namely about 77 per cent. $CaCO_3$. After this correction the mixture was ground to the proper kiln-feed fineness in one 7-ft. by 26 ft. tube-mill, and then sent to the agitated storage tanks prior to burning. The operation of the plant, however, demonstrated that the controls provided for the flotation plant are of such accuracy that the underflow from the 180-ft. thickener can be held uniformly at a satisfactory composition for burning, thereby limiting the necessity of adding wash-mill clay, and operating the wash-mill, to final correction in exceptional cases.

Control of Alkalies.—The raw materials at Paraná include about the normal quantity of alkalies that would be expected in raw composition where alkali aluminum silicates comprise a substantial proportion of the clay minerals. The alkali in the material as quarried averages about 0.71, some of which is soluble, the insoluble portions being combined in the silicates. The feed to the cellhouse averages about 0.57 total alkalies, most of which is eliminated, as the silicates are subtracted along with the coarse quartz and discarded, this also accounting for the reduction in total alumina. The combined flotation concentrates average only 0.13, and the total alkalies in the rejects average as high as 1.45. Although the proportion of the total alkalies occurring in combined form in the fine clay minerals remain in the kiln feed, most of the alkalies are driven off in burning, and the clinker is almost entirely free.

Operating Capacity.—The average tonnages of materials handled at each of the principal change points in the process, in long tons per day, are as follows:

Ball-mill	998 tons
No. 1 Hydroseparator overflow	235
No. 2 Hydroseparator overflow	119
Cell feed	644
Flotation concentrates	401
Rejects	243
Thickener underflow	755

Quality of the Cement.—The cement produced, as described, is of high quality and strength, and remarkable uniformity, the average for the month of July, 1938, being:

Analysis:		*Calculated Compounds:*	
SiO_2	24.43%	C_3S	38.2%
Fe_2O_3	2.03	C_2S	41.3
Al_2O_3	4.91	C_3A	9.6
CaO	65.26	C_4AF	6.2
MgO	0.85	MgO	0.8
SO_3	1.53	$CaSO_4$	2.6
Free CaO	0.33		
Ratio	3.53		98.7%

The clinker produced from the normal composition is easily ground to an average fineness of 96.1 minus 200-mesh and 87.0 minus 325-mesh, with a surface area of 1,888. The initial set was 3:51, and the final set was 6:12.

Tensile Strength	
24 hr.	178 lb.
2 days	266 lb.
3 days	324 lb.
7 days	402 lb.
28 days	486 lb.

German Plants Working Below Rated Capacities

Despite reports of a shortage of building materials in Germany, none of the industries that furnish building materials are fully utilizing their capacities, the Bureau of Mines reports. The gypsum industry is working at only 60 per cent. of capacity, the building-ceramics industry at 60 to 65 per cent., the slagstone industry at 55 to 60 per cent., the lime industry at less than 50 per cent. and the plaster industry at only 30 per cent. of capacity. The situation in the brick industry is believed also to be unfavorable but cannot be checked accurately because of the large number of very small enterprises. Quarries also are operating far below capacity.

The cause for the shortage of building materials frequently is attributed to the fact that the various huge building projects of the German government require large concentrations of building materials at several spots, by which the normal flow of building materials is interrupted and dislocated and the symptoms of an acute shortage are created. As a remedy, it is suggested that concrete and ceramic materials be used even more instead of iron and wood to relieve the serious iron shortage and eliminate the structural and fire hazards due to the increased use of wood.

Centrifuged Bentonite May Compete with Mica

For many years it has seemed that mica was one of the very few substances for which no substitute could be found. Efforts to replace mica with other materials in most of its important electrical uses were invariably unsuccessful.

Recent developments forecast that at last a material can be made by centrifuging bentonite that has virtually all the needed characteristics of mica and that the cost will be so low as to eliminate our former dependence upon British India for an essential raw material. Little information is available as yet, but research is being prosecuted actively by a well-known, capable, private organization, and further developments will be noted with interest by consumers as well as by mica miners, according to Paul M. Tyler, of the U. S. Bureau of Mines.

Producers Continue to Express Views Regarding New Wage-and-Hour Law

"The Fair Labor Standards Act of 1938" went into effect October 24 and employers in all lines of industry are still concerned about the possible effects of its enforcement on their businesses. Responding to an invitation from PIT AND QUARRY'S Directing Editor, both large and small producers in the nonmetallic-mineral industries have freely expressed their views on the law's adequacy and practicability and the difficulties that may be expected to follow its application.

Some of the replies were published in the last two issues; others are published on these pages; still others will appear in the December number. To enable the writers to express themselves without restraint they have been promised anonymity in the publication of their opinions.—DIRECTING EDITOR.

THE 25 c. per hr. minimum is not too high, or too low for this section of the country, that is in the cities. It is too high for the country districts, where common labor is slow and trifling. Fifteen and 20 c. would be more fair for the rural districts.

It will not affect our company to any extent at any of our operations as we now have a 25 c. minimum.

Forty-four hr. per week is entirely too short. My understanding is that this is to be cut to 40 hrs. within a short time. Forty-four hr. at 25 c. means but $11 per week—too little for a man to live on. Down here our men are accustomed to 10- and 11-hr. days. They would much prefer a 50- to 60-hr. week. For instance, at our lime plant there is nothing for a man to do and no place for him to go when he is off, and every day the majority of the men who are off duty "hang around" the plant watching the other men work. The short work week is worrying us; it will mean the work will be divided between more men, each one making less time than he is making now, with the result that neither employer nor employee will be happy.

To make the law workable and fair to all we expect to see state laws similar to the Federal wages-and-hours law so as to cover intrastate operations.

Differentials should be established between different geographical areas. There are certain areas, especially in Arkansas, Mississippi, Alabama, Georgia, etc., where, to offset the inefficiency of labor, lower living costs, the production of cheaper products, wage rates must be real low or the industries will "fold up."

The law will not increase the purchasing power of workers. All the law is going to do is create a lot of dissatisfaction, especially in our section. The men, while having more idle time, will be making less than they are now. What the men really want is more hours of work and a larger income.

Have not given enough thought on the subject to comment on whether the law will improve employer-employee relations, or whether or not it will affect our company.

(Lime and cement—Tennessee)

• • •

THE 25 c. per hr. minimum is not too high, but I am afraid it will prevent inefficient labor from making a living in a great many instances. Our company will not be affected by this 25 c. per hr. minimum at all.

With present unemployment I think 40 hr. for major industries is about correct. Our company is operating on the basis of 5 days per week and 8 hr. per day.

I do not think there should be any differentiation in hours and wages between interstate and intrastate industry.

I feel that labor should be paid according to its value, as discrimination because of geographical areas is very liable to bring about the transfer of industries from higher- to lower-paid districts.

Purchasing power has nothing to do with the rate of wages or hours. This is a simple equation for economists but it is too deep for politicians.

Satisfied workers will finally think for themselves.

We will not be affected by the law's enforcement.

(Cement—California)

• • •

I AM opposed to "chiseling" in wages as well as in industry, and I am of the opinion that there should be some law regulating unscrupulous employers of labor. However, I am opposed to such a law being administered by the Federal government and think that it should be handled by the several states.

If administered by the Federal government, I am afraid that in a short time favoritism will be developed as between different sections of the country, and if this should prove to be the case, quite a number of old and established business concerns would probably be forced out of business by the application of the law.

If the law were administered by the states instead of the Federal government, the question of interstate and intrastate business would not be involved, as practically all business will be placed upon the same footing regardless of whether or not the products produced were consumed within the state or outside the state.

I fully understand that certain objections have been raised to the states administering such laws, it being claimed that it would be impossible to persuade the several states to pass such laws, and if they should be passed, they would lack uniformity. Personally, I think that this objection could be overcome in a course of a few years' time, and that a majority of the states at least would put into effect laws that would meet every demand.

I think the 25 c. an hr. minimum would be fair in that section of the country located south of the Potomac River, but for the industrial East I think a minimum rate of 35 c. would be required to meet the higher costs of living in that section. I also think that so-called Western territory would probably have to have a minimum of not less than 30 c. per hr. Our company will not be affected by the 25 c. minimum rate, as we have been paying a somewhat higher rate for a number of years.

I can not see any serious objection to a 44-hr. week, but think that in most rural sections labor would prefer a minimum of 48 hr. I think that industries should set a standard of from 8- to 10-hr. days, but where it is occasionally necessary to work men longer hours I am opposed to the payment of time and a half.

So long as the minimum rate does not exceed 25 c. and weekly hours are not less than 44, I do not think that our company will be affected by the new law.

I think the law should apply the same to all businesses regardless of whether or not they are classified as interstate or intrastate.

It is my opinion that there should

not be any exemptions from the minimum-wage provisions simply to care for geographical areas. However, I think that the locations of plants and the cost of foods, rents, and other items entering into living conditions should be given serious consideration.

It is my opinion that the country as a whole will not be greatly benefited by the law, but there perhaps are some sections throughout the United States where a rise in income would materially improve living conditions, and if the law will accomplish this purpose it probably is justified.

I believe that, if the administration of the law can be carried out in an unbiased, unprejudiced way, free from political influences, and the influence of labor unions, it would create better relations between the employer and the employee, but if organized labor is permitted to use the law as the stepping-stone for the advancement of its own selfish interests, I am afraid that it will have the opposite effect.

I anticipate some difficulty and confusion in putting the law into effect, and it probably will require several years to make it effective. It is my opinion that the law probably will have to be revised to the extent of clarifying what is interstate and what is intrastate.

(Lime—Virginia)

• • •

WE think the 25 c. an hr. minimum is low enough so that there should not be any violation in any industry on that point. It will not affect our company at all.

We think the 44-hr. week is a good average. We are working 40 hr. It has no effect on us.

To be fair we think the restrictions must be applied to all employers whether they are engaged in interstate activities or intrastate.

While it may limit the number of disputes based upon hours, we believe it will tend to increase the agitation on the wage question.

We do not anticipate encountering any difficulties as a result of this law.

(Lime—Idaho)

• • •

WE believe that the 25 c. per hr. minimum is satisfactory for the present time. This minimum rate will not affect our company in any way.

Since we operate at present fewer than 40 hr., we do not believe that the 44-hr. week is too short. This will not affect our company in any way.

We believe that the wage-and-hour restrictions should apply to all employers, since those engaged in interstate commerce are forced to compete with those engaged in commerce within the state. We believe that it is unnecessary to have uniform wage and hour restrictions for all industries, since the type of work performed and the nature of the industry will certainly govern the output of energy by workmen and therefore should have some effect on the wages and the weekly time. We think it is wise to distribute manufacturing further throughout the country by allowing higher rates of wages in urban centers which will attract the manufacturer to more sparsely settled areas.

We believe that the enforcement of this law will stimulate activity on the part of the manufacturer through replacing labor by machinery wherever possible. We believe in this way that the income and purchasing power of the workers will be correspondingly reduced unless he benefits through increased relief.

Since the wage-and-hour law starts at such a low figure I don't believe that it will either strengthen or weaken employee-employer relations.

The worst difficulty which will be encountered in administering this law will be the expense involved on the part of examiners and recorders.

(Dolomite—Ohio)

• • •

AS our present minimum wage is much higher than the one provided by the law, we will not be affected by its application.

Our company is already operating only 44 hr. per week, so we would not be affected by the hour limitation.

In our opinion the wage-and-hour restrictions should be applied to the entire industry, regardless of the interstate or intrastate nature of its members' businesses.

We see no reason for exemption, at least as far as our state is concerned.

We do not feel that the law will affect employer-employee relations here, but we do believe that it might have the effect of minimizing the influence of labor unions in other parts of the country.

(Sand and gravel—California)

• • •

IN general, I would not anticipate that the 25-c. per hr. minimum will have any material effect on ready-mixed-concrete producers, for the reason that the rate in most instances must be kept in line with the scale on local building work, which in turn is much higher than that paid for such manufacturing. Certainly with our own company neither the initial wage rate nor the ultimate wage rate in the present law means anything, as we are already paying our drivers, operators, and repair men a minimum of 80 c. per hr.

But the arbitrary application of the weekly limit of 44 hr., and ultimately 40 hr., will have very adverse effects on both the companies and the employees engaged in producing ready-mixed concrete. An important feature of the ready-mixed-concrete business, which I have repeatedly pointed out previously, is that of serving the trade when and as it wants deliveries. One of the immediate results of this feature is that ready-mixed trucks must operate at least 9 hr. and frequently nearer 10 hr. daily in order to deliver to jobs during an 8-hr. period. Thus, if a driver were working steadily, he would probably be employed an average of 9 hr. per day, or, in other words, would run out the ultimate 40-hr. week in 4½ days. This feature will be objectionable to the men because it will limit their earnings, and is also objectionable to the employer because, in order to avoid paying overtime, he will have to replace each driver at the end of 40 hr., which in turn will mean having more than one man responsible for a given piece of equipment.

The law, of course, provides exemptions for both seasonal and service operations, but as a ready-mixed-concrete operation does not suspend at any time during the year we probably can not qualify as a seasonal industry, and as our operation contains manufacturing production, we probably will not be classed as a service industry such as a retail store. If the regulations issued by the administrator lead to these results, then the ready-mixed operator is faced with exactly the same limitation on hours as a manufacturer who can stock his product. This will ultimately lead to increased costs to the ready-mixed-concrete producer. This matter of our needing additional operating time over the 8 hr. operated by our trade is not imaginary, and has been recognized in various labor agreements, as, for instance, in St. Louis the straight-time day for contractors is 8 hr., but the straight-time day with our drivers is 9 hr.—it was 10 hr., prior to two years ago.

Another important effect of the operation of the arbitrary weekly time limit, and one which has been generally disregarded, is that of limiting the earning capacity of the man, and in many instances reducing his income under the law to less than he has been earning heretofore. For instance, our drivers frequently work 50 and 55 hr. in a 5½-day week; but under a 40-hr. limitation the individuals will stand to lose some 20 per cent. of their present income in busy weeks with no opportunity of making up during slack weeks. One effect of this limitation of time will, of course, be to spread the work, but this has not been pointed to as one of the objectives of the legislation. I

doubt if this feature is appreciated by the rank and file of employees who are now working longer than 40-hr. per week, and it would seem natural that this will ultimately lead to considerable protest.

In some industries which have been paying very low wages it is possible that the new law will alleviate some labor unrest. However, in the higher hourly rate as a result of the law I anticipate that the effect will be an increase in labor disputes. Certainly to start with, when men like our drivers realize that their earnings will be curtailed, there will result a general demand for higher hourly rates in order to offset the limitation from the 40-hr. week; such demands will create strained relations with employers because there will be resistance against granting increases in rates which are already far above the so-called standard set in the law, even though such standards are intended to be only the minima.

Fundamentally, it is contrary to the American conception of business to have both interstate and intrastate operations subject to any degree of dictatorship from Washington. However, as the American public seems to have acquiesced in accepting this trend in many features of our economic life during the last five years, it may not mean much of a strain to accept such dictatorship of minimum wage and maximum hours for all business. And as it is repugnant to think of a small local operator not being subject to the same restrictions as a larger operator whose activities may step over state lines, the conclusion must be reached that the provisions should ultimately apply to businesses which we have previously considered entirely intrastate.

The matter of geographical differentials, of course, raises many whys and wherefores. My personal feeling is that our country is too large and contains too wide a range of influencing conditions in local economic life to permit the application of uniform standards throughout the country. I am rather sympathetic with the insistence that more liberal features should apply in backward areas. But we must recognize that a general application of that principle would lead to vast shifts in producing centers which in turn would have very damaging effects on investments. However, as this matter was widely discussed during the consideration in the Congress, and as an answer was then adopted in the law, I do not see much object in continuing what must now be an academic discussion, at least until we get a better understanding as to how the law will operate.

(Ready-mixed concrete—Missouri)

THE 25-c. minimum has our approval as it will not affect our company in any way.

The hour limitation provides too short a week. We think 48 hr. should be the minimum, yet we do not believe the law will affect us in this respect.

The law should be applied to the entire industry, and should allow no exemptions for any reason.

I think the law will have the effect of increasing purchasing power, but we do not believe it will weaken the hold of labor unions on their members.

(Crushed stone—Missouri)

• • •

AT present it would appear that we may not be subject to the act, since our business is solely intrastate. However, in the event we should be deemed subject to it, it is our opinion that the minimum wage will have no effect whatever, inasmuch as our lowest wage is much higher.

The rub will come in the 44-hr. week. Because our business is somewhat seasonal, our men prefer to work longer hours in the busy season, in order to make up for lower earnings during winter months. We also prefer to run longer shifts with our regular men than break in new help. We feel that our men are better satisfied if they are allowed to work whenever they are needed, and are not cut off arbitrarily at the end of 44 hr., which would be the necessary result of applying the law to our firm, since we can not afford to pay the penalty wage for overtime.

In spite of our opposition to a 44-hr. week in our own case, it seems that the preferable manner of administration would be by industries rather than by individuals, since if an industry were judged subject to the act, there would be some control over the legions of small, price-cutting firms, who, because of their size, have escaped union regulation, and certain taxes which raise our costs tremendously.

(Sand and gravel—Colorado)

• • •

THE minimum-wage provision of the law will not affect us, nor will the hour requirements, except that we shall be forced to work two shifts instead of one.

The law should be applied to both interstate and intrastate business, and there should be no exemption from its provisions.

Existing purchasing power will be increased by the raising of wage rates. We do think that it will improve employer-employee relations.

(Crushed stone—Texas)

• • •

IN the North the 25-c. per hr. minimum rate is not high enough, due to rates paid by the government on new relief projects. In the South I think the 25-c. per hr. minimum is satisfactory. A minimum rate will not affect any of our companies. In the North we are paying in excess of the minimum rate, while in the South we are paying the minimum rate.

In the North a 44-hr. week should be satisfactory, however, if the government is endeavoring to shift employment from relief pay-rolls to gainful occupation, 44-hr. per week is probably not short enough to absorb the present unemployed. In the South a 44-hr. week is too short, because it does not provide for the operation of a full 6-day week of 8 hr. per day required by plants which operate on a continuous basis.

In both the North and the South more help will be required, and it may even rush shipments, as we would not want to pay time and a half for employees exceeding their 44-hr. week, as we are working now on an average of 54 hr. weekly and it might require our company to have on hand extra crews who will receive at best less than half of the minimum hours work per week in good times, and no work at all through dull periods.

We believe that this determination should be made for all industry; however, each state might be willing to pass a similar law so that wage-and-hour restrictions would apply to industry engaged in interstate as well as intrastate commerce, and one might be willing to say that the wage-and-hour restrictions are unnecessary encroachment of the government on business and should be limited as much as possible.

I do not believe that any minimum-wage provision should affect any certain geographical area, but in the event that the administration should cause a further reduction in the work week and increase the minimum wage, then exemption should be made and differentials established for geographical areas having lower living costs, or higher freight rates, or any other situation of the same general character, which is applicable to one locality and not applicable to another.

According to economic theories, as I understand them, increased wages in the hands of the lower class of laborers should increase the purchasing power, as it is a known fact that this class of workers usually spend 100 per cent. of their income almost immediately upon receipt. However, it may not be sufficient to justify the cost of administration or to justify such governmental interference with general business.

We do not believe that the operation of this law will improve employer-employee relations until the government

discontinues spending the enormous amounts of money that it is spending for the general purpose of being re-elected, and I think it is pretty generally conceded that we will always have labor unions as long as our politicians look to labor parties for support at election time.

It seems to me that to carry out this law more help will be required, a greater amount of bookkeeping will be involved, there will be more employees to handle, and employees would probably expect increased hourly rates to compensate for the decreased maximum working period. Of course, I make this statement with reservations, as it would depend entirely upon the way the new director would interpret the operation of several phases of the law, and I firmly believe that there will be the same practical difficulties in enforcing this law as were experienced under the N.R.A. of which it is a step-child.

My personal opinion is that the business executive is on the "spot" and really his decisions have very little value, for I have found in my experience that decisions made to-day are absolutely worthless to-morrow. . . .

(Feldspar—New York)

• • •

THE wage-and-hour limitations set by the new law are all right as they will not effect our company.

We believe the laws must be applied sectionally, making allowances for differences in economic and social conditions.

We expect purchasing power generally to be improved.

In our judgment the law will not improve employer-employee relations as labor agitators will continue to stir up trouble.

(Cement—New York)

• • •

THE 25c. per hr. minimum is too low. It will not affect us, except as competing plants may be able to establish much lower rates than we are paying.

Forty-four hr. a week are too short for some weeks in some of our departments which are spasmodic in their operations.

In our retail departments, where there is fluctuation in the time of need between good-weather and bad-weather weeks, the A. F. of L. affiliates, of which our men are members, generally approve of 48-hr. weeks for all land jobs. This we feel is reasonable to meet the fluctuations in the building-material lines.

We have a certain number of marine workers in connection with our dredge, barge, and tug service and these men of necessity have to average 66 hr. per week, living on the equipment and moving from port to port. It has not yet been determined how the men in the marine service will be classified under the new act, or whether they will be included in it. If this problem of marine workers is not fairly interpreted, it will become very serious to all operators requiring water employment.

Unquestionably the only fair and equitable decision is to make the law apply to an industry without regard to the interstate or intrastate situation affecting any particular plant.

Only to a moderate extent should differentials be established between different geographical areas.

Although it will eliminate some small operations whose existence depends upon low wage scales and long hours, the law should raise buying power. However, the loss of employment by shutting down such marginal plants should, generally speaking, be offset by the added employment in those plants operating on the higher standards.

It would probably reduce the opportunities for union activity in some of the lower wage-scale regions, but should not change the situation in those regions where the best plants are paying wages in excess of the new minimums.

In addition to the points mentioned above we feel the biggest problem of all will come under the head of "enforcement". This is where the N.R.A. fell down and the same experience may be repeated in trying to establish the new law.

(Crushed stone—Pennsylvania)

• • •

WE have no objection to the hour-and-wage provisions of the law, and they will not affect our company in any way.

In our opinion the law should be applied uniformly to interstate and intrastate business, and we do not believe that there should be any exemptions for any reasons.

We don't know whether purchasing power will be improved by the law, and we seriously doubt whether it will improve the relations between employers and employees.

(Lime—California)

• • •

THE 25-c. an hr. rate is too low; we think labor is entitled to better pay than the minimum. It will not affect our company as we pay double the minimum for common labor.

The 44-hr. week is too short for sand-and-gravel producers in the northern territory, where we are located. Northern-territory business is seasonal, and our employees to a man prefer to work overtime during the production season so they can obtain whatever pay-roll we have to carry them during our lay-off or unseasonal period. Should we be confined to a 44-hr. week we would double crews, not creating more pay-roll, but dividing the money between nearly twice as many men, making a complement of employees with a much lower total pay and all the men would have only half as much to live on during our unseasonal period, provided, of course, they could not get work in some other line, and there does not seem to be, at any time, enough work to guarantee their finding other jobs when the winter season is on. We will have a large number of dissatisfied employees.

By all means interstate and intrastate should be treated alike. It seems reasonable that exceptions from the minimum-wage provision should be made in favor of geographical areas because of lower living costs. This would not be different from the history of industry to date.

We do not believe that the operation of this law will improve employee and employer relations. We think it will tend to more discontent.

Unless our industry can obtain from the administration of this law a longer work-week—say, from 56 to 60 hr.—our present employees will be very much dissatisfied and will soon become a roving bunch of men trying to find better working conditions and better pay in unseasonal industries. This, of course, will seriously affect economic production with fully experienced men, which after all is the only thing keeping many companies alive to-day.

(Sand and gravel—Ohio)

• • •

I THINK the 25 c. an hr. minimum wage is too low. Most of our employees are common laborers and our minimum wage is 67½ c. per hr.

The 44-hr. week is O. K., and will not affect our company as our men have been working on a 40-hr. basis for some time.

I think the wage-and-hour restrictions should be applied to all employees, not alone to those engaged in interstate commerce. If this can not be done, it should not apply to anyone.

I think that exemptions from the minimum wage should be made in favor of certain geographical areas, because of lower wage standards or lower living costs, but it should not be less than 25 c. per hr.

I believe the law's application will improve purchasing power and improve relations between employers and workers. In the operation of our own plant I see no actual practical difficulties with the law's enforcement.

(Industrial sand—Illinois)

Aggregates Production May be Classed as Seasonal Industry

THE exemption of seamen from the application of the provisions of the Fair Labor Standards Act of 1938 and the possible classification of the sand-and-gravel industry as seasonal within the meaning of the act engaged the attention of the board of directors of the National Sand & Gravel Assn. at Washington on September 28 and 29.

The law specifically exempts from the wage and hour provisions of Sec. 6 and 7 "any employee employed as a seaman." As a number of sand-and-gravel producers obtain and transport their products on navigable waters, determination of what constitutes a seaman is important. The board approved the dispatch of a letter addressed to Elmer F. Andrews, administrator of the law, and reviewing court decisions and Federal statutes defining a seaman. The letter enumerates three classes of floating equipment used by the industry on navigable waters: (a) Non-self propelled vessels which dig and process sand and gravel; (b) tug boats, tow boats, self-propelled dredges, and other self-propelled vessels; and (c) barges or scows. The crews and officers of such equipment are shown by the evidence presented in the letter to fall within the classification "seamen" as commonly and legally interpreted.

The fact that sand-and-gravel production is often controlled by climatic conditions seemed to some of those present sufficiently important to justify designating the sand-and-gravel industry as seasonal. Executive Secretary Ahearn pointed out in this connection that there appeared to be a tendency to classify as seasonal only those industries, such as fruit-packing, for example, whose operations are definitely determined by the seasonal availability of their raw materials and which are at a complete standstill at all other times.

The competition that exists between, on the one hand, producers who ship across state lines and, on the other hand, producers who do not do so, in the opinion of those board members who commented on the subject, makes it inequitable to apply the wage-and-hour restrictions of the Fair Labor Standards Act to the one type of producer and not to the other. Uniformity and equality in the applicability of the law and in the enforcement of its provisions appeared to the members to be highly desirable.

The board considered a communication received from the National Crushed Stone Assn. on the proposal to form a single industry committee to represent the aggregates industries—crushed stone, sand and gravel, and slag. The board members were of the opinion that the sand-and-gravel association should not ask for the appointment of an industry committee at this time.

The objectives of the government's Temporary National Economic Committee were discussed, and the questions asked of trade-associations were read to the members. Through the efforts of Mr. Ahearn, the questionnaire in its final form includes questions designed to reveal the research and technical advisory services rendered by trade associations to government departments and officials as well as to their members.

Other subjects discussed were the program for the coming convention (which will be held on January 25 to 27, 1939, at the Netherland Plaza Hotel, Cincinnati), wage determinations under the Walsh-Healey Act, and methods of acquiring new members.

Stanton Walker, the association's director of engineering, reported on the work of his department and on the results of the arrangement by which the association's research activities have been carried on at the University of Maryland. Those who attended the meeting made a tour of inspection of the laboratory facilities there.

Mr. Walker mentioned the possibility of developing in connection with the university some undergraduate work on subjects of interest to the industry. As the result of a conversation on this subject with Dean R. S. Steinberg of the university's College of Engineering, he suggested the following subjects for undergraduate theses:

1. Adhesion of Bitumen to Aggregates.
2. Accelerated Soundness Tests of Aggregates.
3. Effect of Grading of Aggregates on Concrete.
4. Workability of Concrete.
5. Stability of Bituminous Mixtures.
6. Method of Measuring the Shape of Aggregate Particles.
7. Study of the Los Angeles Rattler.
8. Detection of Organic Impurities in Aggregates.
9. Effect of the Time of Mixing and the Length of Haul on the Strength and Slump of Concrete.
10. Effect of the Temperature of Aggregates and Water on the Characteristics of Concrete.
11. Test of Vibrated Concrete.
12. Effect of Temperature on Concrete.

The following persons attended the directors' meeting:

OFFICERS AND DIRECTORS

Vincent P. Ahearn (executive secretary), National Sand & Gravel Assn., Washington, D. C.

Paul P. Bird (vice-president), Boston Sand & Gravel Co., Boston, Mass.

H. S. Davison, J. K. Davison & Bros., Pittsburgh, Pa.

J. R. Hill (president), Gifford-Hill & Co., Inc., Dallas, Tex.

M. A. Neville, Western Indiana Gravel Co., Lafayette, Ind.

George W. Renwick, Chicago Gravel Co., Chicago, Ill.

John M. Settle, Ohio River Sand Co., Inc., Louisville, Ky.

OTHER MEMBERS AND GUESTS

David Alexander, Petersburg Sand & Gravel Co., Petersburg, Va.

J. F. Berger, John A. Roeblings' Sons Co., Trenton, N. J.

W. A. Bliss, Dravo Corp., Pittsburgh, Pa.

H. P. Caldwell, Ohio River Sand Co., Inc., Louisville, Ky.

Alexander Foster, Jr., Warner Co., Philadelphia, Pa.

H. V. Owens, Eastern Rock Products Co., Utica, N. Y.

A. M. Parker, Smoot Sand & Gravel Co., Washington, D. C.

S. A. Phillips, PIT AND QUARRY, Chicago, Ill.

N. C. Rockwood, *Rock Products,* Chicago, Ill.

Stanton Walker (director of engineering), National Sand & Gravel Co., Washington, D. C.

Will Construct Plant to Crush Roofing Granules

A large crushing plant will be constructed near Somerville, N. J., by the Staso Milling Co., a subsidiary of Central Commercial Co., manufacturers of roofing granules.

The plant will be located on property purchased from the North Jersey Quarry Co., of which the Bound Brook Crushed Stone Co. is a subsidiary. Contracts for the design and construction of the new plant are reported to have been awarded to the Austin Co.

Several hundred thousand dollars will be invested in the new project, which will comprise nine buildings having concrete foundations, roofs and siding of corrugated steel and requiring 300 tons of structural steel.

FIRST FAIR-LABOR ACT INTERPRETATION

THE question as to whether or not a producer or plant, selling wholly within the borders of one state products made from raw materials obtained wholly within that state, must comply with the requirements of the Fair Labor Standards Act of 1938 seems to be answered definitely in the negative by the first interpretive bulletin of the Wages and Hours Division of the Department of Labor, issued October 16 by the office of the general counsel. This settles, for the time being at least, all doubts as to whether producers who ship across state lines will be required to pay higher wages and to work their employees fewer hours than their competitors who do not engage in interstate commerce. The bulletin reports the views of Administrator Elmer F. Andrews and General Counsel Calvert Magruder.

On this subject Interpretive Bulletin No. 1 states: "The act does not cover plants where the employees work on raw material derived from within the state and where none of the product of the plant moves in interstate commerce. This is true even though the product so manufactured and sold locally comes in competition with similar products which have been manufactured elsewhere and have been moved in interstate commerce." According to the bulletin, provisions designed to include such local industries appeared in various drafts of the bill, but were not included in the bill as it was enacted into law.

This interpretation illustrates the inconsistencies and inequities that result from a system of Federal government under which, however worthy the objective of any law, the Federal government is hampered in its efforts at equitable enforcement by the legal fictions of state barriers. Under such a system producers engaged in interstate commerce are forced to consider seriously the problem of whether they shall continue to do business as in the past and be subject to the law's provisions, or whether they shall withdraw from interestate commerce and escape the law.

The interpretations shed light on another important problem, namely, whether all the employees of a business that is subject to the law must be employed at the rates of wages and during the hours of employment specified in it, or fixed by the industry committee that may be appointed under it, regardless of whether each one of them is involved "in the production of goods for" (interstate) "commerce." The interpretation states: "The second category of workers included—those engaged 'in the production of goods for (interstate) commerce'—applies typically, but not exclusively, to that large group of employees engaged in manufacturing, processing, or distributing plants, a part of whose goods moves in commerce out of the state in which the plant is located." This apparently disposes of the theory, held by many employers, that they could pay some of their employees a lower scale of wages and work them for longer hours because they were not employed on goods for interstate commerce, while paying higher wages and operating for fewer hours in the cases of those employees who might be so engaged.

It is to be understood that these interpretations are merely indications of the Administrator's position with respect to those parts of the law which do not carry with them specific authority to define. The complete text of the bulletin follows:

The statute does not confer upon the Administrator any general power to issue rulings including industries within the coverage of the act, or excluding them. At one stage of the legislative history, a draft of the act provided that the Administrator should hold a succession of hearings with reference to the various industries, after which hearings, if the facts warranted, he was required to issue an order declaring the industry to be an industry affecting interstate commerce; and by virtue of such order the particular industry was to come within the application of the act. No such provision was included in the bill as it finally passed. Under the act, employments are included or excluded by the terms of the statute itself as interpreted by the courts, and not by the force or any administrative action. Interpretations announced by the Administrator, except in certain specific instances where the statute directs the Administrator to make various regulations, definitions and classifications, serve therefore to indicate merely the construction of the law which will guide the Administrator in the performance of his administrative duties, unless and until he is directed otherwise by authoritative ruling of the courts.

Under Sec. 6 and 7 the wage-and-hour provisions are applicable to employees "engaged in commerce or in the production of goods for commerce". "Commerce" is defined as trade, commerce, transportation, transmission, or communication among the several states, or from any state to any place outside thereof or roughly, "interstate commerce". In the preliminary declaration of policy in Sec. 2 the Congress recited that it sought to remedy certain evils, namely, "labor conditions detrimental to the maintenance of the minimum standard of living necessary for health, efficiency, and general well-being of workers", which the Congress found "(1) causes commerce and the channels and instrumentalities of commerce to be used to perpetuate such labor conditions among the workers of the several states; (2) burdens commerce and the free flow of goods in commerce; (3) constitutes an unfair method of competition in commerce; (4) leads to labor disputes burdening and obstructing commerce and the free flow of goods in commerce; and (5) interferes with the orderly and fair marketing of goods in commerce". From this declared policy of the Congress it is evident that, apart from certain specific exemptions enumerated later in the statute, the Congress intended the widest possible application of its regulatory power over interstate commerce; and the Administrator, in interpreting the statute for the purpose of performing his administrative duties, should properly lean toward a broad interpretation of the key words, "engaged in commerce or in the production of goods for commerce".

It is noted that the coverage as described in Sec. 6 and 7 does not deal in a blanket way with industries as a whole. Thus, in Sec. 6, it is provided that every employer shall pay the statutory minimum wage to "each of his employees who is engaged in commerce or in the production of goods for commerce". It thus becomes an individual matter as to the nature of the employment of the particular employee. Some employers in a given industry may not be subject to the act at all; other employers in the industry may be subject to the act in respect to some of their employees and not others; still other employers in the industry may be subject to the act in respect to all their employees, except those specifically exempted by the later provisions of Sec. 13(a).

The first category of workers included—those "engaged in (interstate) commerce"—applies typically but not exclusively, to employees in the telephone, telegraph, radio and transportation industries, since these industries serve as the actual instrumentalities and channels of interstate commerce. Employees who are an essential part of the stream of interstate commerce are also included in the phrase "engaged in

commerce"; for example, employees of a warehouse whose storage facilities are used in the interstate distribution of goods.

The second category of workers included—those engaged "in the production of goods for (interstate) commerce"—applies typically, but not exclusively, to that large group of employees engaged in manufacturing, processing, or distributing plants, a part of whose goods moves in commerce out of the state in which the plant is located. This is not limited merely to employees who are engaged in actual physical work on the product itself, because by express definition in Sec. 3 (j) an employee is deemed to have been engaged "in the production of goods, if such employee was employed in producing, manufacturing, mining, handling, transporting, or in any other manner working on such goods, or in any process or occupation necessary to the production thereof, in any state." Therefore, the benefits of the statute are extended to such employees as maintenance workers, watchmen, clerks, stenographers, messengers, all of whom must be considered as engaged in processes or occupations "necessary to the production" of the goods. Enterprises can not operate without employees of these kinds. If they were not doing work "necessary to the production" of the goods they would not be on the payroll. Significantly, it is provided in Sec. 15 (b) that "proof that any employee was employed in any place of employment where goods shipped or sold in commerce were produced, within 90 days prior to the removal of the goods from such place of employment, shall be *prima facie* evidence that such employee was engaged in the production of such goods." Hence, except for the special categories of employees within the exemptions of Sec. 13, all the employees in a place of employment, where goods shipped or sold in interstate commerce were produced, are included in the coverage, unless the employer maintains the burden of establishing, as to particular employees, that their functions are so definitely segregated that they do not contribute to the production of the goods for interstate commerce as these terms are broadly defined in the act.

The act does not cover plants where the employees work on raw materials derived from within the state and where none of the product of the plant moves in interstate commerce. This is true, even though the product so manufactured and sold locally comes in competition with similar products which have been manufactured elsewhere and have been moved in interstate commerce. Provisions designed to include such local industries appeared in various drafts of the bill, but were stricken out and not included in the bill as it finally passed.

Since the act contains no prescription as to the place where the employee must work, it is evident that employees otherwise coming within the terms of the act are entitled to its benefits whether they perform their work at home, in the factory, or elsewhere.

The act is not limited to employees working on an hourly wage. The requirement of Sec. 6 as to minimum wages is that the employee must be paid *at the rate of* not less than 25 cents an hour (the rate is stepped up in succeeding years). This does not mean that employees can not be paid on a piecework basis after October 24; it merely means that whatever the basis on which the workers are paid, whether it be monthly, weekly, or on a piece-work basis, they must receive at least the equivalent of the minimum hourly rate. Rules and regulations to be prescribed by the Administrator will provide for the keeping of records in such a form as to enable compensation on a piecework basis to be translated into terms of an hourly rate.

This bulletin does not deal with the various important exemptions provided in the statute. Some of these exemptions are self-executing; others call for definitions and classifications by the Administrator, as to which announcements will be made as soon as possible.

Orders Rate Reduction on Rip-Rap to Dam

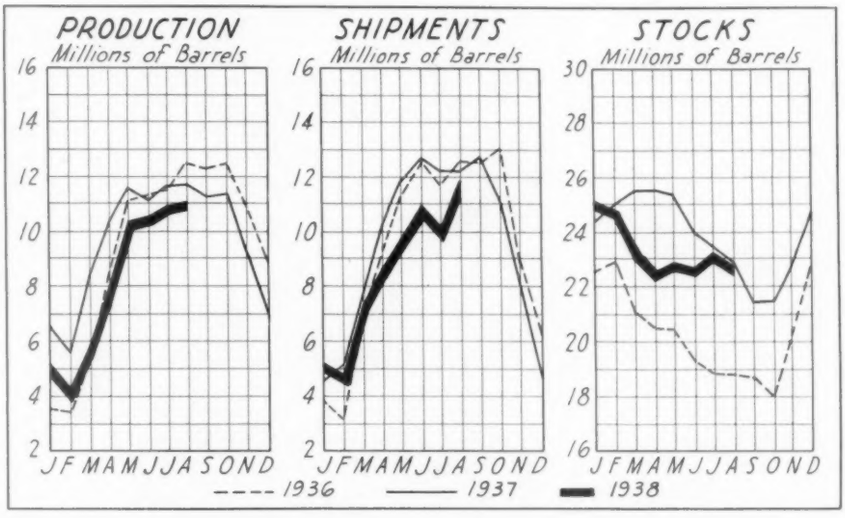
The Nebraska Railway Commission has ordered the Missouri Pacific and Union Pacific Railroads to reduce the freight rate on carload shipments of rip-rap between the Nehawka quarries in eastern Nebraska and the Keystone Dam site in the western part of the state, from $2.30 to $1.80 per ton.

The order allows the Nebraska quarries to compete equally with Wyoming quarries although the latter are considerably closer to the dam site. Following the commission's order, the Missouri Pacific, Union Pacific and Burlington Railroads joined in asking the commission to change the rate to a more equitable basis.

The reduction, effective Oct. 22, resulted from a hearing last summer where railroad representatives and persons interested in seeing that Nebraska rip-rap dealers get to supply at least part of the 500,000 tons of stone for the dam project, appeared.

Nebraska rip-rap interests have let the commission know that unless the intra-state rate was reduced they would not be able to supply stone to the project as cheaply as closer Wyoming dealers, shipping out of the Glendo and Guernsey quarries. Though it is considerably farther from the Nebraska quarries to the dam site than from the Wyoming quarries to the dam site, the reduction makes the freight rates equal.

Cement Shipments Ahead of Output



The Portland cement industry in August, 1938, produced 11,007,000 bbl., shipped 11,823,000 bbl. from the mills, and had in stock at the end of the month 22,470,000 bbl., according to the Bureau of Mines. Production and shipments in August, 1938, showed decreases of 7.5 and 3.8 per cent. respectively, as compared with August, 1937. Stocks at mills were 2.0 per cent. lower than a year ago. These statistics were compiled from reports for August received by the Bureau of Mines from all manufacturing plants.

By P. J. FREEMAN

Industrial Minerals of the Tennessee Valley Discussed at AIME Meeting

THE Industrial Minerals Division and Society of Economic Geologists of the American Institute of Mining and Metallurgical Engineers held a fall meeting in Knoxville, Tennessee, October 6, 7, and 8, 1938, with a registration of over one hundred fifty, which was greater than that of any previous meeting of these divisions. As the name indicates, the program of meetings for these society divisions covers a great variety of subjects. Papers were presented concerning materials found in the Tennessee Valley, with a wide range of subjects, such as barite, sienna, slate, rock asphalt, marble, titanium, zinc, pegmatites, coal, bleaching clay, feldspar and methods for prospecting and testing materials for concrete aggregates, dam foundations and building stones.

The technical session of the Industrial Minerals Division was probably of more interest to readers of PIT AND QUARRY than those sessions which were devoted to highly specialized materials. A paper on *Methods Used in Prospecting for Mineral Aggregates,* by Edgar R. Kendall, of the Tennessee Valley Authority, described the fundamental principles which the engineer should follow in prospecting for a suitable source of supply of concrete aggregates for a definite project. The speaker pointed out the financial importance of the aggregate industry, and the necessity for making comprehensive studies of all sources of supply prior to the planning of any large project. Methods for sampling aggregates which can be furnished by commercial producers for use on large and small projects were described, but particular emphasis was placed on the methods to be used where developments such as dams are to be constructed in localities where regular supplies of concrete aggregates are not available. The author described the methods used by the Tennessee Valley Authority for prospecting the sand and gravel deposits in the Tennessee River for the purpose of insuring an adequate supply of such materials within a reasonable shipping distance from the proposed damsite, and at the same time by such prospecting enable the engineers to predict the quality of aggregates and the grading of materials which might be produced from such sources.

In a similar way the author described the method used for locating large supplies of rock for use in aggregates and by means of a peg model showed methods which may be used for studying the depth and quality of rock obtained from such deposits by means of core drilling. He also pointed out the necessity for making regional surveys of such sources of supply and mapping the economic values of such materials based on shipping rates to the damsite. It was emphasized that judgment is necessary in evaluating a source of supply and the engineer must keep in mind the fact that if a structure is to be built, he must obtain materials within a reasonable shipping distance and the structure must be so designed that these materials will produce a durable concrete rather than attempt to ship better material over long distances.

The second paper on *Durability Studies of Aggregates,* by W. E. Cate, also of the Tennessee Valley Authority, described the procedure used by the Authority in making durability tests on aggregates and concrete for the construction of the various dams being built by the Authority. It was pointed out that the usual sodium-sulphate tests are of value for making studies of rock but that in some cases the tests seem to be too severe and it is desirable to parallel the investigation with freezing-and-thawing tests made not only on the aggregates, but on finished concrete, using the same cement and mixtures proposed for the project. Such tests are necessary when the size of the project is such that a slight difference in cost for a given material would amount to a large sum of money.

Details for the mixes and methods for testing the concrete were given by the speaker and a number of slides were used to show the behavior of the specimens after various numbers of cycles of freezing and thawing. The disintegration of concrete due to the popping of cherty gravel was shown and a description given of the freezing-and-thawing tests used for studying the behavior of such gravel in concrete. Specific reference was made to comparison of the behavior of cores taken from well known structures which had withstood the action of the weather over a period of years and their behavior when submitted to freezing-and-thawing tests in the laboratory. The author pointed out that it was possible to draw some conclusions from such tests but that a vast amount of additional work should be done before freezing-and thawing tests may be recognized as a standard method for selecting materials for use in concrete. They are very valuable however, as a basis for making an intelligent opinion when used in combination with various other studies.

Following the papers on prospecting and testing the materials, was a third paper by an employee of the Tennessee Valley Authority, F. Cadena, on *Production Methods at Hiwassee Dam Aggregate Plant.* The author has specialized in the design of plants for production of fine and coarse aggregate from rock, and last year presented a paper before the same society describing the methods used by the Authority for producing fine and coarse aggregates at Norris Dam. His paper describes the improvements and methods used at Hiwassee Dam, with some of the same equipment transferred from Norris Dam, and he gave a flow sheet which shows in much detail the travel of the materials through the various channels until they reach the final stock pile.

The plant consists of primary and secondary crushers and a group of hammer-mills. A noteworthy feature of the Hiwassee plant is it successful use of hammer-mills on very abrasive material. The hammer-mills at Norris were fed a dolomite containing about 5.5 per cent. silicate. At Hiwassee the feed is graywacke, which consists mostly of quartz. In spite of the more abrasive character of the feed, hammer wear in terms of 4-mesh production is no greater at Hiwassee than it was at Norris with the dolomite. The smaller feed used at Hiwassee of 1½-inch top size, compared with 3-inch at Norris, and the fact that graywacke is more friable than dolomite has made it possible to operate without grate bars at Hiwassee. The author stated that the rate of hammer wear at Hiwassee in terms of minus 4 mesh product is 0.032 pounds a ton, in comparison with 0.034 pounds a ton at Norris, using the same kind of hammers. However, in terms of power consumed the rate of wear has been 0.027 pounds per hp. hour at Hiwassee, and at Norris it was

(Continued on page 67)

LIME PRODUCTION PROBLEMS

BY W. R. CLIFFE

Lining the Rotary Lime Kiln—Part I

IT is possible that not all producers of commercial lime realize that refractories, next to fuel, are the most important single factor entering into the manufacture of their product from the standpoint of cost per ton of output, the various items following each other in this descending scale of importance: fuel, refractories, explosives, and power. Therefore, a discussion of rotary-kiln linings may be of timely interest.

Modernization, especially as it pertains to the lime industry, has brought about many changes in manufacturing processes. There has been a very noticeable tendency toward concentration of output in fewer units of relatively greater individual capacity. Also there has been a decided striving for much improved efficiency. It is therefore not surprising that the severity of operating conditions is in some instances rendering obsolete practices that were formerly satisfactory. In no phase of this evolution is a knowledge of change and a willingness to face facts more vital than in the case of fire-brick.

There is no question but that the manufacturers of refractories have kept well abreast of these fast-moving times so that the operator with a thorough knowledge of lining requirements has a wide field from which to make a selection, and, if he will avail himself of the engineering services offered by the leading makers, his refractory difficulties can be minimized.

Approximately twenty years ago the usual first-quality fireclay brick was generally considered adequate for lining and the burning zones of rotary kilns, the same brick being used in the intermediate and preheating zones as well. If the operator was thoughtful, he would ask for a "hard-burn", if he intended using the bricks in the low-temperature sections of the kiln, as it was thought that hard-burning made them a little more resistant to the abrasion of the rolling stone charge. The type of high-heat-duty fireclay brick, which was used most extensively in the burning zones, contained approximately 38 to 40 per cent. alumina. This class of brick served the purpose more satisfactorily than the highly-siliceous fireclay brick, because operation was even more intermittent then than now. Bauxite bricks, made from that mineral and containing approximately 60 per cent. alumina, were used to some extent in the hot zone but, as they were relatively more expensive than the high-alumina blocks on the market to-day, they were not in general favor. Neither were they developed to the high degree of physical and chemical qualities of the several types of high-alumina brick now available. The commercial brands of high-alumina brick manufactured to-day, generally from the mineral diaspore, are far superior to the bauxite blocks of some years ago in that they possess vastly improved physical properties, such as stability of volume when subjected to high temperatures, lower porosity, which accounts for less impregnation by fluxes, higher resistance to spalling, and greater mechanical strength.

About fifteen years ago the high-alumina refractories were widely adopted, and their use in the calcining zones of rotary kilns has become very extensive. The greater need for this type of lining was attributable to the increasing severity of operating conditions, accompanying high productive rates, and demands for a more thoroughly burned lime of higher quality. Refractories manufactu.ers met the needs for better brick in the high-alumina field by precalcination of the diaspore at high temperatures, particle sizing of the brick mixtures, machine molding under very high pressures, vacuum pressing, and extremely hard burning of the brick.

Bricks of the 70-per cent. alumina class are more widely used in burning-zone linings, although many kilns give satisfactory results with 60-per cent. alumina bricks, while in a few plants 50-per cent. alumina bricks will be found in service.

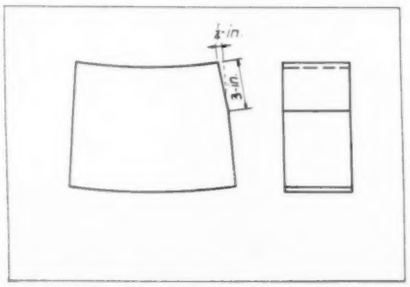


Fig. 1

At a number of plants where lime sludge has been burned in rotary kilns it was the general practice for some time to insulate the 70-per cent. alumina bricks which were used most extensively in the burning zones. However, this practice has been discontinued and there are but a few plants in the paper industry that still insulate the burning zone. In these cases the conditions imposed upon the rotary-kiln linings in any event were relatively moderate, inasmuch as the kilns were not operated at very high capacities. Lime sludge, resulting from the causticizing of soda, usually contains an appreciable amount of alkali, which naturally contributes to fluxing of the refractory lining in that zone which is subjected to the highest temperatures. Lime is used for causticizing purposes at plants manufacturing soda, at paper mills, and at sugar refineries.

Because of the generally satisfactory service of the 70-per cent. alumina rotary-kiln liner, the lime industry has shown very little interest in the 80-per cent. alumina blocks or the chemically-bonded magnesite bricks. In the latter instance it is quite possible that with the elimination of many other factors, which tend to limit the life of refractories, the high cost of bricks of this type will be found justifiable. However, their high thermal-expansion rate makes them unattractive at present. But where refractory dolomite is burned at exceedingly high temperatures, and the life of high-alumina linings was numbered in days, magnesite has been employed with great savings.

Of course, the temperature of the kiln—referring primarily to the disassociation zone—is exceedingly important, and the refractory used must be capable of withstanding temperature, however attained, with the least amount of fusion, softening, or fluxing with materials that come in contact with it. The highest flash temperature can not be disregarded, since, even though it may be of only short duration, damage to the lining may follow. Localized intensely-hot sections exposed, for example, to flame impingement, improper draft, or exothermic reactions, should be lined with bricks possessing the characteristics necessary to withstand

such treatment. Naturally such qualities are not to be expected of ordinary rotary-kiln liners.

The terrific thermal shocks resulting from rapid temperature changes can be very largely controlled, especially where fans, dampers, draft recording, and control equipment have been provided. Many think of these changes as occurring on the operating line during periods of short interruptions. This, however, is rarely the case. The greatest loss through spalling occurs during the very rapid chilling of the lining resorted to in order to get men into the area to be repaired as quickly as possible. (There always seems to be a shortage of lime.) Later, during the repair period with heavy air movement —especially in warm weather work can be speeded by induced draft—through the kiln, the lining in a 300-ft. kiln weighing approximately 300 tons will absorb many additional tons of moisture. Then comes the firing-up, with usually the same shortage of lime present, and we are producing lime in a few hours, whereas in a vertical kiln usually three days will have elapsed before the charge and the lining are in a condition to allow drawing.

Much of the spalling or popping of the inner inch or so of the hot-zone liners can be prevented by following a

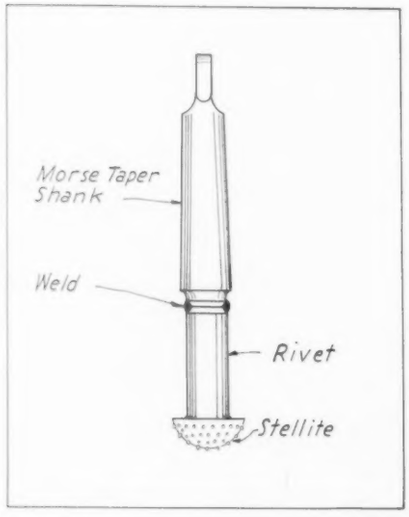


Fig. 2

few simple rules and by a more careful job of brick-laying.

1. The writer finds that the "popping off" of the inside face of the brick can be largely eliminated and the life materially lengthened by beveling one inside edge of the liner as shown in Fig. 1.

2. The bevel thus provided on one edge only will allow for some inner-face pinching due to irregular laying and resulting from

(a) Temperature differential between the inner face exposed to direct heat and the lower section.

(b) Radial misalinement caused by placing some of the blocks against the kiln shell, while others are placed on the tops of the rivet heads of a longitudinal-joint plate.

(c) Radial misalinement resulting from backing against the kiln shell, which is not perfectly circular.

(d) Laying with radial joints too tight. A little stiff clay or a sheet of No. 100 kraft paper placed between the joints will also help.

3. Many operators do not care to take the time to "cut out" for the rivet heads, but this is of paramount importance in the burning zone. By allowing the brick to rest on the tops of the circumferential- and longitudinal-joint rivet heads, about ⅝ in. of the end of the brick is exposed on all sides and will generally spall off on its first exposure. If the spalling would stop with the loss of the exposed portion, it would not be so bad, but irregular fracture often results in a loss which may ultimately reach several inches.

A simple, cheap, and fast method of providing a neat depression in the back of the brick is to obtain a rivet of the same size and style as the rivets in the kiln and have the welder drop small beads of Stellite all over the head, the rougher and more irregular the better, then provide the other end of the rivet with a shank that will fit a slow-speed air or electric drill (Fig. 2). The mason, by placing a small quantity of fireclay on the top of each rivet head to be covered by the next block and then resting the block neatly thereon, can remove the block with the wet clay plainly marking the exact position of the rivet heads. The Stellite-treated rivet mounted in the drill will make very quick work of the cutout and the block will rest solidly against the shell. Like care is hardly necessary for intermediate- and cold-zone lining placement.

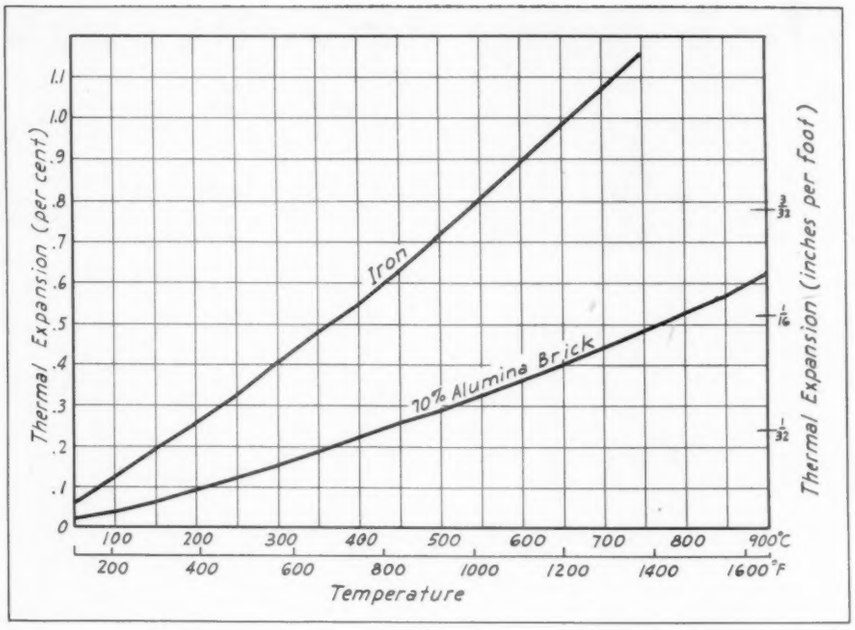

Thermal Expansion (per cent)
Thermal Expansion (inches per foot)
Iron
70% Alumina Brick
Temperature
100 200 300 400 500 600 700 800 900°C
200 400 600 800 1000 1200 1400 1600°F

Fig. 3

4. Good condition of the kiln shell is an aid to hot-zone lining longevity.

At the time of purchasing a rotary kiln in order to reduce the first cost some operators will specify plate that is 1/16 or even ⅛ in. to light in gage. Theoretically, the lighter gage will meet all requirements with an ample safety factor, but the designer and fabricator of the shell have no way of knowing that the lining may be kept in service until it is 2 in. in thickness or less; that power or some mechanical failure may cause stalling and warping of the shell; that the shell may be operated for months at a temperature of 800 deg. F. or higher (see Fig. 3); that the lining may be thick on one side of the kiln and thin on the other, thus setting up terrific tortional stresses; that a riveted joint may work, causing severe internal friction on the lining; that a section of the lining may wear through or drop out, allowing temperatures sufficient to distort the shell. But possibly for competitive reasons he does not insist on that extra gage to insure ruggedness. A rotary kiln can well be compared with a crawler tractor in that its ability to perform what often seem to be miracles leads to the impression that its capabilities are limitless, and, therefore, exposure to conditions for which it was never intended become everyday occurrences. The shell and the refractory combine to form a rotary kiln. In composition they are unlike,

but as partners they are inseparable. When one is damaged, the other is always affected also.

One of the most important factors contributing to the ultimate destruction of refractories is chemical action. The formation of slags is of the widest general significance in this connection. Many fuel ashes are very corrosive; for example, those from wood refuse and from some fuel oil which are highly alkaline, also low-fusion coal ash high in basic-oxide content. The fluxing of refractories by contact with dust in gases is a common phenomenon. Frequently exothermic reactions are involved in a process and tend to exaggerate the chemical action upon the brick. As an illustration, the action of carbon monoxide over a critical temperature range, approximately 420 deg. to 470 deg. C. (788 deg. to 878 deg. F.), caused by either ferric or ferrous oxide acting as a catalyst in decomposing the gases, can result in the deposition of sufficient carbon to disintegrate bricks containing only small percentages of uncombined iron oxide. Under certain conditions steam in the kiln atmosphere causes serious damage to the refractories. Many common variables could be named. However, a few of the everyday variety are intensity of operation, type and size of the raw material used, fuels, the degree of fineness of dust in the gases, the workmanship of the brick masonry.

Operators of rotary kilns are inclined to overlook, or to discount as being trivial, the porosity of the bricks, some entertaining the opinion that bricks of low porosity are more inclined to spall. This is generally incorrect, and the opposite condition has been found to exist. Where bricks of coarse grind and controlled grain size are used, both unusually high resistance to spalling and strength are embodied. Furthermore, within certain classes, the highest thermal conductivity and greatest heat capacities are obtained. Perhaps the greatest danger resulting from the use of bricks of the slightly higher porosities lies in their tendency to become impregnated with a slag as a result of which chemical reaction can progress very rapidly. Even though the slag may not have a corrosive effect, the penetration accompanied by certain gases has a destructive effect. As this penetration is generally localized in the exposed section of the block, swelling takes place with the usual result that the end of the brick is pinched off and the action then continues into the new'y-exposed face until disintegration is complete.

We all are more or less familiar with the expansion curves of various refractories, and in rotary kilns expansion has been fairly accurately provided for. However, it is the permanent volume change with which we may well concern ourselves. Volume change and appreciable alteration of the textures of the blocks usually follow excessively-high temperatures, if held for a sufficient length of time. Mineral inversions, which are accompanied by either expansion or contraction as the case may be, occur. Softening of the refractories causes shrinkage, while the development of an overfired vesicular structure results in swelling.

No single factor in rotary-kiln practice is more worthy of concentrated thought and study than the refractory lining. Variations in the length of service occur, sometimes great ones, and it would seem that the solution should be simple. Probably the greatest difficulty lies in the length of time required to reach definite conclusions. Copious notes, which record in great detail all the factors contributing to the placement of the lining, the service conditions, interruptions, etc., will prove of inestimable value, and with such factual data available refractories engineers can more readily diagnose the trouble. For instance, at one lime plant where rotary kilns are used for calcining the stone, the life of the refractory linings in the burning zone was always shorter during periods of wet or freezing weather. It was found that the difference in service was attributable to the fact that an appreciable amount of wet clay adhered to the kiln-feed stone, and at the temperature in the hottest zone of the kiln caused excessive fluxing. This is mentioned chiefly because similar conditions are common where open quarrying methods are employed. However, some of the modern plants provide washing facilities to insure clean kiln feed.

A.I.M.E. *(from page 64)*

only 0.010 pounds per hp. hour. The reason the wear per ton of product is not any higher at Hiwassee than it was at Norris, is due to the fact that a ton of product at Hiwassee represents roughly only one-third as much work as it did at Norris.

Berlen C. Moneymaker, Geologist, Tennessee Valley Authority, presented a paper on *Building Stones of Western North Carolina*. Materials available in that district, such as marble, as it may be found in the many quarries throughout that district, was discussed and the author gave examples where such marbles are being used. It was stated that in spite of the great variety of rocks in this area, material of known commercial value is somewhat limited. Granite has a wide distribution in western North Carolina, and the speaker called particular attention to the famous Mount Airy quarry, which has been operated with so much care and efficiency that the entire amount of material taken from the quarry has been marketed in one form or another so that there is no waste pile after a production of over forty million cubic feet of granite.

The author also described the production and uses of syenite, gneisses, quartzite and pseudodiorite, and his paper gives tables of the chemical analyses and compressive strengths of these various materials obtainable in western North Carolina.

The same author presented a paper on *The Use of the Large-Diameter Core Drill for Geologic Exploration,* written in collaboration with Portland P. Fox, Assistant Geologist, Tennessee Valley Authority. The paper describes the construction and operation of core-drilling equipment, suitable for taking cores varying in diameter up to 72-in. Such drills are operated by means of steel shot, or similar material, at a speed of about 50 r.p.m. The cores are extracted in various ways and it is usually necessary to break off the sections by means of explosives. Large diameter core-drilling is now an accepted method of geologic exploration, particularly for damsites. It is possible by going down into the holes to make a thorough study of the defects in dam foundations which would be overlooked from studies made with smaller cores. The geologist descends into the hole and reads the depths of cavities, studies significant stratigraphic or structural features, and is able to sketch the conditions on specially-prepared log sheets. The author gives specific examples of the use of such methods at Wheeler, Guntersville, Chickamauga and Norris Dams, and points out the advantages of this method under the conditions found at those damsites. The cost for extensive drilling at Norris was at an average of $8.86 per foot of depth. The author points out, however, that drilling a large diameter hole is a time-consuming process, and that from six to nine feet in an eight hour day is considered good progress. It is stated that in soft but solid rock the cost of drilling may be as low as $5.00 per foot and in rock presenting difficult drilling conditions, the cost may be $50.00 a foot.

In addition to the five general sessions, the visitors were taken on a number of inspection trips where the operation of marble quarries and zinc mines were studied. The next meeting of these divisions will be in connection with the annual meeting of the A.I.M.E., which will be held in New York City next February.

Personal Mention

DOUGLASS R. JUDD, who has long been identified with the sale of machinery to quarries and mines in that section, is now representing the Nordberg Manufacturing Co. in northern California and Nevada, devoting most of his time to the sale of Symons crushers and screens.

HOMER LAWRENCE was taken to an Oklahoma City hospital recently, his right leg crushed at the knee, when it became enmeshed in the hydrator at the plant of the Dunlap Lime Co.

HAROLD D. SCHNITZLEIN, operating superintendent of the Hannibal, Mo., plant of the Universal Atlas Cement Co., was honored recently when he was presented with the E. H. Gary 25-Year Service Medal by the parent company, United States Steel Corp. He started working in the laboratory of the old Atlas plant on October 23, 1912.

FRED V. GARDNER has been named acting treasurer of the Chain Belt Co., Milwaukee, Wis., to fill the vacancy created by the recent death of C. L. Pfeifer. Mr. Gardner, who has been connected with the company since early in the year in a consulting capacity, was formerly associated with General Electric Co.

WILLIAM J. FEARY, for a number of years engaged in the building-material business in the San Francisco bay area, has joined the sales staff of the Pacific Portland Cement Co.

Generoso Pope, president of the Colonial Sand and Stone Co., accepting the first of a fleet of Cummins Diesel-powered trucks, the largest ever ordered in New York, from F. F. Stanniford, left, president of the Mack International Motor Truck Co., at 30 Rockefeller Plaza, New York, N. Y. The trucks, which employ ten speeds forward and two speeds reverse, make up a $650,000 order. The entire delivery will be completed within two or three weeks.

FRANK G. SHEETS, president of the Portland Cement Assn., has returned to Chicago after a business trip to the Pacific Coast.

LUDWIG EMDE has been appointed district sales manager at Detroit by the Worthington Pump & Machinery Corp., Harrison, N. J. He succeeds W. J. DALY, who has been transferred to Philadelphia.

W. R. STUARD is erecting a plant to produce sand and gravel at Hardentown, Ind.

J. G. BRADLEY and LEWIS V. SMITH have established a plant in Casper, Wyo., for the manufacture of Dunbrik.

ALLIE SCHIMMEL of Manitowoc, Wis., was installed as president of the Cement Workers Union, No. 21,144, at ceremonies conducted Sept. 21 at Manitowoc. Other officers for the coming year are VIGGO MADSEN, vice-president; EDWARD ANDERSON, recording and corresponding secretary; OTTO W. MAREK, financial secretary and treasurer; HENRY PRINCE, guardian, and RAYMOND MILEY, WILLIAM GIEGEL and FRANK DUFFY, trustees.

HARVEY NICHOLSON, St. Louis, Mo., a graduate of the Missouri School of Mines and Metallurgy, Rolla, Mo., has been added to the laboratory staff of the Stearns Magnetic Mfg. Co., Milwaukee, Wis.

YALE D. HILLS has been made manager of distributor sales for the service-sales division of the Timken Roller Bearing Co., Canton, O. For several years he has been manager of the Los Angeles branch.

ARTHUR M. HILL, Charleston, has been named president of the West Virginia Sand & Gravel Co. and of the Standard Brick & Supply Co., succeeding the late George E. Sutherland. Directors of both companies met in Charleston, W. Va., Sept. 10. Oscar F. Henry was named acting general manager of both companies.

WILLIAM W. BOND has been appointed western sales manager of the positive-drive division of Link-Belt Co., with headquarters at the Dodge plant in Indianapolis, to succeed G. HOWARD BURKHOLDER, deceased.

ARTHUR ROEDER, president of the Colorado Fuel & Iron Co., has been elected a director of the Alpha Portland Cement Co. to fill the vacancy caused by the death of J. H. LOCKHARD.

V. P. AHEARN, executive secretary of the National Sand & Gravel Assn., has been named treasurer of the American Trade Assn. Executives.

A. E. MARKGRAF, of Pontiac, Ill., is opening up a quarry and crushing plant near Wyoming, Ill. Superintending construction of the new plant is HOWARD MARKGRAF, nephew of the owner.

C. BRANTINGHAM and BURL CARDWELL have organized the Ozark Agricultural Limestone Co. and established a plant at Johnson, Ark.

JOSEPH D. BAKER, 85, a director of the Standard Lime & Stone Co., Baltimore, Md., died suddenly on October 6 at his home in the Francis Scott Key Hotel in Frederick, Md. Death was caused by heart failure.

LYLE STONE, 26, employed in the quarry of the Western Shale Products Co. near Fort Scott, Kan., met his death recently when he was struck by a flying fragment of stone during a blast.

COL. SAM TATE, 78, chairman of the board of the Georgia Marble Co., died Oct. 11 at his pink marble mansion in Long Swamp valley, near Tate, Ga. Since 1905 he had held control of vast quarrying and manufacturing interests built up from the 160-acre tract purchased by his grandfather in 1835 for $150.

FRANK SHELDON WHEELER, 61, prominent industrialist and developer of phosphate lands, died recently. He was a resident of Mt. Pleasant, Tenn., coming to Tennessee from Vermont forty years ago, with his father, who was also a leader in Maury County, Tenn., phosphate developments.

EARL BERRY, 45, plant foreman of the Van Camp Sand & Gravel Co., Covington, Ky., met death by suffocation in a sand hopper at the company's plant a few weeks ago.

CLAYBORNE S. BLACK, 52, who had been connected with the Lawrence Portland Cement Co. at its Philadelphia office for many years, died October 9 following a stroke.

BOOKS WORTH READING

THE RELATION BETWEEN LOS ANGELES ABRASION TEST RESULTS AND THE SERVICE RECORD OF COARSE AGGREGATES, *by D. O. Woolf, U. S. Bureau of Public Roads. 10 p. Reprinted from Proc., Highway Research Board, Vol. 17, 1937, by National Sand & Gravel Assn., Washington, D. C.*

Because all states do not have the same range in quality of coarse aggregates, and one state with an abundance of hard rock will consider certain test values for quality as necessary which could not be used by other states, it must be emphasized that recommendations are subject to change with local conditions. In general, however, it appears that there is a definite relation between the loss in the Los Angeles test and the service record of materials used in concrete, bituminous construction and surface treatment. On the basis of the data available, the following percentages of wear appear to be suitable for use in specifications to control the quality of coarse aggregates: concrete, 50 per cent.; bituminous surfacing, 40 per cent.; surface treatment, 40 per cent.

Definite correlations between the loss in the Los Angeles test and the strength of concrete are found; the lower the percentage of wear the higher the concrete strength. Definite correlations are also found with the results of a circular track roller test and a test for soft or friable pieces. It appears that the Los Angeles test gives accurate indication of the quality of the material under test, and that its use in specifications controlling the acceptance of coarse aggregate is warranted.

LABOR'S ROAD TO PLENTY, by *Allen W. Rucker. Published by L. C. Page & Co., Boston, Mass. Price $2.50.*

The author, prominent pricing expert, sales counsel and practical business economist, proposes in this book a sound basis for a return of the American system of freedom and enterprise, and of rewards in proportion to individual worth. He demonstrates an extremely simple principle of labor compensation that might be applied individually in any plant to restore harmonious labor relations. Mr. Rucker also points out the comparative end-results to labor and industry in the unionized or regulated industries and over thirty other major industries. Although observing a sober, factual approach to his subject, the author warns that unless the policy of wage regulation is abandoned, there is certain to follow permanent, large-scale unemployment, a lowering of the standard of living and, eventually, Fascistic Federal control of both industry and labor.

MARKET CIRCULARS, *by George I. Whitlatch, associate state geologist of Tennessee. Published by Tennessee Department of Conservation, Nashville, Tenn.*

A series of four pamphlets covering the occurrence, operations, prospects and market data on (1) limestone, (2) talc, (3) tripoli, and (4) bauxite in Tennessee and neighboring states.

Offers New Calculator

An improved grade-and-haul calculator for 12-cu.yd. Carry-all scrapers—a scientific, accurately engineered and carefully prepared slide-rule for easy computation of all vital earth-moving data—is now ready for free distribution through all Caterpillar agencies or by writing R. G. LeTourneau, Inc., at either the Peoria, Ill., or Stockton, Cal., offices.

Millions of yards of dirt and thousands of time studies form the background for its countless possible computations. Thus, it is able to accurately—

1. Determine production and costs over any distance of haul up to one mile, over any grade or combination of grades, at any established unit cost per hour based on any load range from 7 to 32 pay yards, with several combinations of scrapers and Caterpillar D8 tractors.

2. Determine the expected delivery per hour over any one haul with 12-cu.yd. Carryalls, single or tandem.

3. Determine the probable cycle in minutes per trip, single or tandem, over any haul distance up to a mile.

4. Determine the expected trips per hour over any haul, up to a mile.

5. Show the maximum haul distance possible, based on some combined predetermined cost per cubic yard of material and per hour cost for the unit.

6. Find the time in minutes to travel any distance up to a mile in a given tractor gear and speed.

Canadian Refractories, Ltd., Montreal, recently granted manufacturing and sales rights of its products in the United States and Mexico to Basic Dolomite, Inc., Cleveland, O. W. D. Stewart, former sales manager of Canadian Refractories, Ltd., is now vice president of Basic Dolomite, Inc.

A Haiss Belt Conveyor

in its class is just as outstanding in quality as a HAISS LOADER.

See Bulletin 1127 for proof of its simple, strong, *High Grade* construction—at a price you can afford. Low receiving end is ideal for unloading hopper-bottom cars.

Ask for the Bulletin

Any length to 60 Feet

WRITE, WIRE OR PHONE

HAISS

George Haiss Mfg. Co., Inc., 142nd St. & Rider Ave., New York

Who, for over 40 years, have created and sold none but equipment of demonstrable superiority in design and manufacture.

Bucket Loaders — Clamshell Buckets

SECO

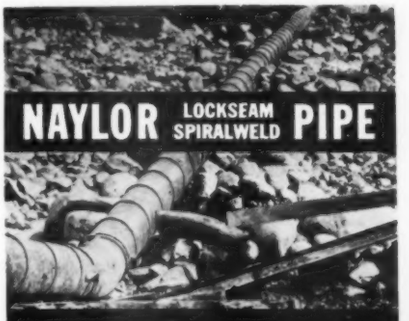
VIBRATING SCREENS

Patented

A scientifically designed screen with an entirely new principle. Faster and more accurate sizing, obtained by a positive, controlled circular motion. A feature exclusive with Seco.

SCREEN EQUIPMENT CO.

9 Lafayette Ave. Buffalo, N. Y.



NAYLOR LOCKSEAM SPIRALWELD PIPE

...The Pipe with the Built-in FLEXIBILITY *that absorbs shock loads — protects your lines .. another reason to specify Naylor!*

Sizes from 4" to 30" in diameter with all types of fittings and connections. Complete fabrication service. Quotations on your requirements furnished promptly.

WRITE FOR CATALOG No. 37

NAYLOR PIPE COMPANY

1237 EAST 92nd STREET

CHICAGO, ILLINOIS

Traffic News Digest

RECENT I. C. C. DECISIONS

Cement.—In response to 4th section applications No. 17,205 and No. 17,254 the Commission has authorized the Gulf, Mobile and Northern and the Nashville, Chattanooga and St. Louis to establish and maintain a rate on hydraulic, natural or Portland cement, in straight or mixed carloads, minimum 50,000 lb., except where for carriers' convenience a car of less capacity is furnished, the minimum will be the marked capacity of the car, but not less than 40,000 lb., from Richard City, Tenn., to Mobile, Ala., over the lines of the above carriers, such rate to be the same as that concurrently in effect over the direct route from and to the same points, constructed on the basis prescribed or approved in "Southern Cement Rates, 132 ICC 427," as supplemented, but not lower than the present rate over the direct route, and to maintain higher rates from, to and between intermediate points. Rates from, to and between the higher rated intermediate points shall not exceed the rates constructed on the basis prescribed or approved in the Southern Cement Rates case plus general increases authorized in 1937 and 1938 and in no instance may exceed the lowest accommodation of rates. I. C. C. F. S. O. No. 13,233 Cement from Richard City, Tenn., to Mobile, Ala.

Sand.—Finding the rate on silica sand in box cars from Ottawa, Ill., to Thorold, Ont., Canada, applicable between Nov. 29, 1935 and June 15, 1936 not shown to have been unreasonable, the Commission has dismissed the complaint in I. C. C. Docket No. 27,915 Excelon Co. *v.* Belt Railroad of Chicago, *et al.*

EXAMINERS' REPORTS

Ground Limestone.—Examiner George Esch proposes that the Commission find the rates on ground or pulverized limestone from Joliet, Ill. to Lowell, Ind. unreasonable but not unduly prejudicial to the extent that it exceeded $1.20 a net ton and that the shipments described on the freight bills as ground limestone fluxing stone which moved via the E. J. & E. after Jan. 25, 1936 were overcharged to the extent that the rate charged exceeded 80 c. a net ton. He also proposes that on shipments of roofing granules from Wausau, Wis., to Lowell, Ind., the rates be found to have been unreasonable to the extent that it exceeded $2.70 a net ton and that on shipments of granules from Pine Hill, to Lowell, Mich., the rates be found unreasonable to the extent they exceeded $3.20 a net ton. He also proposes an award of reparation. I. C. C. Docket No. 27,744 Globe Roofing Products Co., Inc. *v.* Northwestern *et al.*

Sand.—Examiner Harold M. Brown recommends that the Commission find the carload rates on industrial sand from Mapleton, Pa. of $2.00 a ton to Elmira, N. Y. and $2.10 a ton to Olean, N. Y. after July 1, 1935 unreasonable to the extent they exceeded or may exceed the bases of rates prescribd in Industrial Sand Cases 1930, 204 I. C. C. 159. He also recommends an award of reparation. I. C. C. Docket No. 27,979 Thatcher Mfg. Co. *v.* Pennsylvania.

NEW COMPLAINTS FILED

Amesite.—Alleging violations of sections 1, 3 and 4 in connection with the rates on processed asphaltic limestone from Margerum, Ala., to Fulton, Miss., with stations and shippers in Kentucky allegedly preferred, new rates and reparation are requested in a complaint filed by C. Eugene Fowler, 610 Woodward Bldg., Birmingham, Ala. in I. C. C. Docket No. 28,111 Alabama Asphaltic Limestone Co., Birmingham, Ala. *v.* Mississippi Railroad, *et al.*

Sand.—A petition has been filed by the Trunk Line Railroads operating in Pennsylvania asking for a 13th section investigation regarding the Pennsylvania intrastate rates on industrial sand. The carriers contend that the Pennsylvania Commission in a number of cases has prescribed reduced rates which threatens to break down the rate structure on industrial sand. The Interstate Commerce Commission in "Industrial Sand Cases 1930," 188 I. C. C. 90 and 204 I. C. C. 159 has prescribed rates for the interstate movement of industrial sand and the carriers are asking that the Pennsylvania intrastate rates be brought up to this level.

TRAFFIC NEWS

Chamber of Commerce Conference.—A transportation conference was recently held under the auspices of the Chamber of Commerce of the United States. No action was taken at this meeting but it was decided to hold a conference later preparatory to submitting a transportation program to Congress when it meets in January. The conference met in executive session and gave authorized reports to newspaper men after each session. The spokesman appointed was Samuel T. Bledsoe, President of the Santa Fe who said that the transportation committee of the Chamber of Commerce had received 59 suggestions relating to all phases of the transportation problem and that they had decided to consider first major noncontroversial topics including the following:

"1. Revision of the rate-making rule. 2. Power of the states as to rates. 3. Consolidations. 4. Loans to railroads. 5. Repeal of land-grant statutes. 6. Grade crossings and railroad bridges. 7. Railroad boards of adjustment. 8. Government competition. 9. Reparation."

Emery R. Johnson, Professor of Transportation of the University of Pennsylvania, submitted the following memorandum of points to be included in the proposed railroad legislation.

"1. Introductory paragraph. Purpose and policy of the statute. 'The maintenance upon a sound financial basis and the further development of an adequate and efficient system of transportation by railraods under private ownership and operation.'

"2. As regards railroad consolidation. (a) Repeal the requirement that the I. C. Commission shall prescribe and prearrange general plan of grouping. (b) Give the Commission power to authorize a company to exercise the right of eminent domain in acquiring property that has been included in a proposed consolidation that has been approved by the Commission—the Commission to fix the value of the property thus acquired.

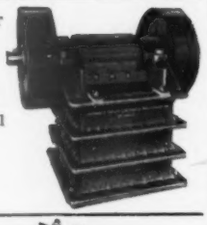
"3. Reorganization of insolvent railroads. Establish a special court of three judges to handle all consolidations. Probably some amendments to section 77 may be helpful in shortening procedure.

"Consideration may well be given to providing for greater cooperation of the Commission with solvent carriers in working out

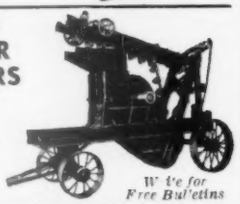
ROADS whether mountain or farm to market under any condition
you can depend on
GRUENDLER EQUIPMENT
Established 1885

STRAIGHT LINE ROCK AND GRAVEL CRUSHING AND SCREENING PLANTS

Bronze or Roller Bearing
JAW CRUSHERS
Heavy plate steel or cast steel Constructed
Large capacity
Small power Requirements



PORTABLE
HAMMER CRUSHERS
Ideal for farm to market road work. Crushes stone 1 inch down to agriculture dust.



W've for Free Bul'etins

GRUENDLER
CRUSHERS · PULVERIZERS · GRINDERS
GRUENDLER CRUSHER & PULVERIZER CO.
2915-21 N. Market St., St. Louis, Mo.

DO NOT TOLERATE
DUST
IT COSTS MONEY
•
DRACCO ENGINEERS
have over 20 years experience
CONTROLLING DUST
Write Them
•
DRACCO CORPORATION
4077 E. 116th Street
CLEVELAND, - - OHIO

THE NEW
LEAHY SCREEN

for
Fine
Screening

The new Leahy No-Blind Vibrating Screen is unsurpassed for fine screening. The Leahy vibration principle keeps the entire screen surface working at *top efficiency*, insuring *increased capacity*, with *maintenance costs negligible*. It pays large dividends on your investment. Investigate its advantages and economy.

The Original
DEISTER CONCENTRATOR COMPANY
Incorporated 1906
911 GLASGOW AVE., FT. WAYNE, IND.
104 Pearl St., New York

plans of capital reorganization. The statute to state principles and policies to be carried out by the Commission.

"Statute to require provision for amortization of new bond issues.

"4. New rule of rate making. The Commission to fix rates that, so far as possible, will give carriers a reasonable rate of return upon the property used in performing the services rendered. The statute should declare rates to be legal that yield only a fair rate of return upon the property devoted to the performance of services for which the rates are charged.

"5. Adjustment of intrastate rates, by the Commission in harmony with interstate rates when prescribed. The state authorities to seek action in the courts if they object to the Commission's orders.

"6. Provide by statute that rates may be so adjusted (and shall be so fixed) that carriers may accumulate a surplus in times of business prosperity.

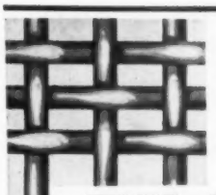
"7. Exempt the railroads from the tax on undistributed profits—'to promote stability of service and employment.'

"8. Repeal of reduction of rates for government transportation services by the land grant railroads.

"9. Require railroad carriers to obtain Commission's approval purchase of stock of other railroads and of nonrailroad companies. Commission regulation, but not prohibition, of railroad holding companies.

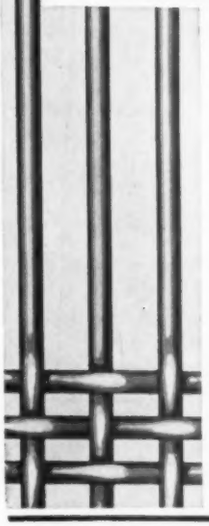
"10. Such amendments to railroad labor legislation as will place carriers and labor organizations on an equal footing as regards negotiations and responsibility for observance of agreements and contracts."

Members of the Transportation Conference in attendance included V. P. Ahearn, executive secretary, National Sand & Gravel Assn., W. H. Day, chairman Executive Committee, National Industrial Traffic League, Chester H. Gray, director, National Highway Users Conference and representatives of many other industries, associations and transportation systems.



NO. 9381
TY-ROD
U. S. PATENT
NO. 2,024,806
TRADE-MARK REG.

TY-ROD
HIGH CAPACITY
SCREEN



for
DAMP
STICKY and
FIBROUS
materials

TYLER
WOVEN WIRE
SCREEN CLOTH
in All Meshes
and All Metals

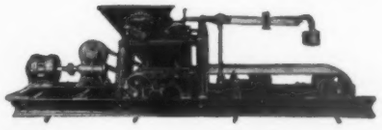
TYLER-NIAGARA
SCREENS

HUM-MER and
TYPE 400 SCREENS

SCRUBBING and
DRYING
MACHINERY

THE W. S. TYLER
COMPANY
Cleveland, Ohio

MATERIAL weighted
and proportioned with
99% Accuracy



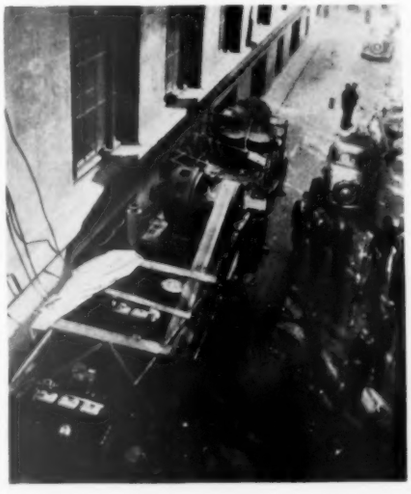
Weighing and proportioning material with 99% accuracy, Schaffer Poidometers are recognized throughout the cement industry as important equipment in modern plant control.

Schaffer Poidometers are automatic in action and will operate continuously or, with a mechanical weighmaster attachment, will provide batch operation.

This efficient weighing equipment is now saving thousands of dollars throughout the cement industry. Many leading plants are now saving money while obtaining greater efficiency with Schaffer Poidometers. Let us help solve your proportioning and feeding problems. *Write for catalog No. 5.*

SCHAFFER POIDOMETER COMPANY
2828 Smallman Street Pittsburgh, Pa.

SCHAFFER POIDOMETERS



When the tail-end of a South Seas hurricane turned inward, the accompanying 40-ft. tidal wave all but inundated Providence, R. I. Power and light supply failed. When the water receded, a number of Cummins Diesel power units were hurriedly brought in, connected to generators in alleys behind buildings and have been supplying electricity ever since. They will probably stay on the job quite a while, since the salt water has caused unpredictable destruction to underground conduits and power lines.

BACON
FARREL
CRUSHERS

Complete Plants
Designed and
Equipped.
Screens, Elevators, Conveyors, Quarry, Sand and Gravel Plant Equipment.
Engineering Service.

EARLE C. BACON, Inc.
17 John Street New York, N. Y.

Occupational Diseases and the Law

Injury

The Iowa Workmen's Compensation Law (Code Sections 1361 *et seq.*) provides that compensation shall not be paid on account of a disease "unless it shall result from . . . injury" (Sec. 1421), and consequently in various decisions it has been held that an occupational disease is not compensable.

However, it has been held, most recently in *Almquist v. Shenandoah Nurseries,* 218 Iowa 724, 254 N. W. 35, that "a personal injury, contemplated by the Iowa Workmen's Compensation Law, obviously means an injury to the body, the impairment of health, or a disease, not excluded by the act, which comes about, not through the natural building up and tearing down of the human body, but because of a traumatic or other hurt or damage to the health or body of an employee. . . . The injury to the human body here contemplated must be something, whether an accident or not, that acts extraneously to the natural processes of nature, and thereby impairs the health, overcomes, injures, interrupts, or destroys some function of the body, or otherwise damages or injures a part or all of the body. This is the personal injury contemplated by Sec. 1421 of the 1931 Code. . . . Of course, such personal injury must be the result of the employment 'and flow from it as the inducing provimate cause.' . . . But such personal injury need not arise out of an accident."

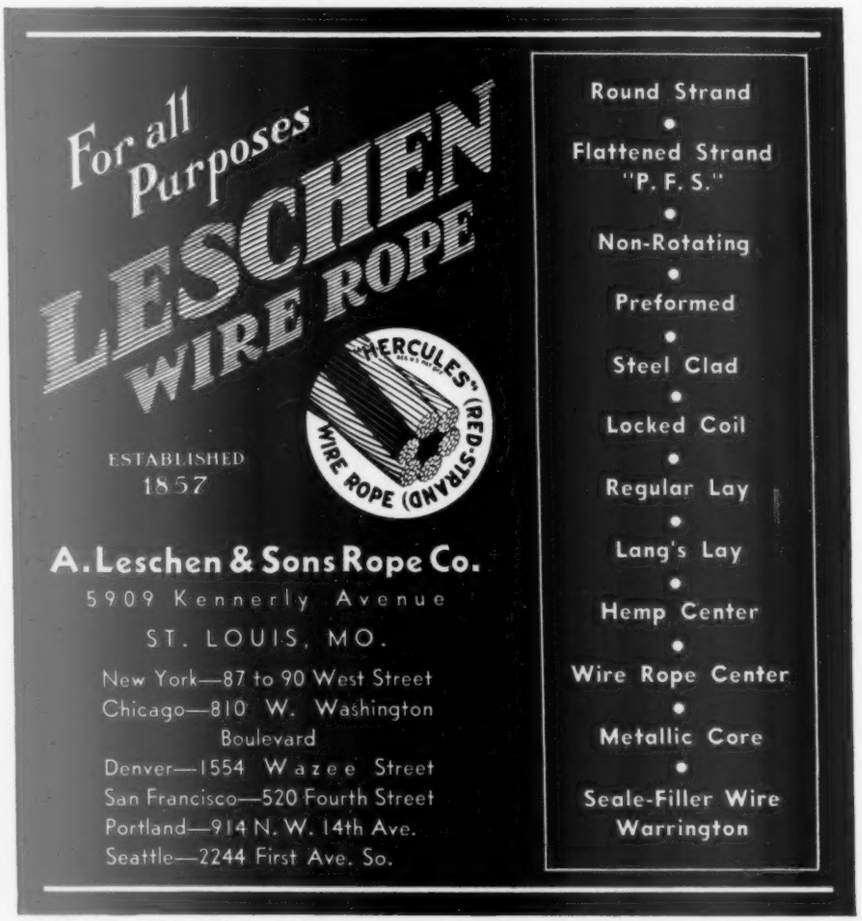
These principles are applied by the Iowa Supreme Court in *Black v. Oreston Auto Co.,* decided August 5, 1938, reported at 281 N. W. 189. In this case a workman's claim for compensation for total temporary disability and partial permanent disability, resulting from inhalation of poisonous fumes from a gasoline torch in which the employer negligently or inadventently used tetraethyl gasoline as fuel was denied by the Industrial Commission on the ground that lead poisoning is a disease occupational in its inception and expressly excluded under the Workmen's Compensation Law (Sec. 1421). The Supreme Court, and the district court below it, held that the lead poisoning under the circumstances was not a natural or ordinary result of the employee's occupation, but was the result of the use of a thing that was dangerous and unsafe; consequently "his injuries were as directly due to injury suffered by him in the course of his employment by the defendant as if he had fallen off a defective ladder or had in any way been given an unsafe place in which to work. That he was gradually stricken and frequently overcome was just as much an injury suffered in the course of his employment as if he had been stricken suddenly by some external and violent means." The court, therefore, affirms the district court's judgment ordering the commission to allow compensation.

Suit in Tort

Sec. 34 of the Louisiana Workmen's Compensation Law, as amended, provides "That the rights and remedies herein granted to an employee or his dependent on account of a personal injury for which he is entitled to compensation under this act shall be exclusive of all other rights and remedies of such employee, his personal representatives, dependents, relatives, or otherwise, on account of such injury."

The Louisiana Court of Appeal, Second Circuit, in *Jackson v. Southern Kraft Corp.,* decided June 1, 1938 (rehearing denied June 30, 1938; writ of certiorari and review denied August 5, 1938), reported at 183 So. 135, points out that this provision has been strictly enforced by the courts in all cases wherein an injured employee, or his dependents, in case of his death, "sought to circumvent its stringency by suing in tort," citing *Roy v. Mutual Rice Co. of Louisiana,* 177 La. 883, 149 So. 508; *Williams v. Blodgett Const. Co.,* 146 La. 841, 84 So. 115; *Philips v. Guy Drilling Co.,* 143 La. 951, 79 So. 549; *Daigle v. Moody et al.,* 140 So. 842.

An injured plaintiff may sue for workmen's compensation and, as an alternative in the same suit for damages under Art. 2315 of the Louisiana Civil Code, but such procedure is indicated "where there is doubt as to whether the relationship of employer and employee exists when the alleged employee is injured." Where, as in the Jackson case, the relationship of employer and employee is admitted, plaintiff and defendant are bound by the provisions of the Workmen's Compensation Law, with special reference to the quoted section making the remedies of that law exclusive.



In the Jackson case the Court of Appeal affirms a judgment of the district court below, denying compensation on account of partial loss of eyesight. The denial was based largely on the insufficiency of the evidence; however, the court holds that "should it be held that plaintiff's impaired vision was caused exclusively, or nearly so, from exposure to the regular daily heat, glare and flames of the furnaces he attended, over the long period he worked for defendant, the best that could be said for him would be that his disability is an incident to and a result of the nature and character of work by him performed. It would be classed as an 'occupational disease,' and it is well established that disability superinduced by this character of disease is not compensable. *Canella v. Gulf Refining Co.*, La. App., 154 So. 406; *Faulkner v. Milner-Fuller, Inc.*, La. App., 154 So. 507; *McLain v. N. O. Public Service, Inc.*, 12 La. App. 668, 126 So. 701; *Freiss v. Lone Star Cement Co.*, La. App., 161 So. 209."

Accidental Injury

Dawe v. Norge Division of Borg-Warner Corp. et al., decided by the Michigan Supreme Court, October 5, 1938. The court in this case affirmed an award of compensation to the widow of an employee who died as the result of inhaling sulphur-dioxide gas while in the employ of the defendant company. The award was granted and confirmed on evidence that the inhaling of the gas did not occasion "a disease incident to his occupation" (occupational diseases are not compensable in Michigan), but "a fatal attack from a different source and, therefore, fortuitous."

In a lead-poisoning case, *McIntyre v. The Bohn Aluminum & Brass Corp. et al.*, decided October 3, 1938, the Michigan Supreme Court affirms the principle that the Supreme Court is not a trier of fact or weigher of testimony, but must affirm the decision of the Department of Labor and Industry on questions of fact.

The Nordberg Manufacturing Co., Milwaukee, Wis., has completed arrangements with La Consolidada, S. A., Mexico City, for the sale and service in Mexico of Symons cone crushers, screens, and the complete line of Nordberg power tools for the maintenance of railroad track.

The Buda Co., Harvey, Ill., has announced the appointment of J. S. Innes, Ltd., Bay and Yorkville St., Toronto, as exclusive representatives in the province of Ontario. The Innes organization will handle the complete line of Buda gasoline and Buda-Lanova Diesel engines for industrial, automotive and marine use.

The extra STRENGTH is in the *Spiral*

THE once necessary evil of using *heavier* pipe than was needed in order to obtain the required *strength*, was wiped out when Taylor Forge pioneered spiral pipe.

That spiral seam makes it possible to produce a pipe that is light walled and therefore less expensive to buy, ship, and use—yet strong in every way, thanks to the spiral reinforcement which stiffens it from end to end—holds it round and true against collapsing strains—gives it bursting strength even beyond that of a seamless tube of equal gauge.

You simply choose the gauge you need for the job, never paying a penalty for superfluous weight. Let it cut the cost of water, sand and gravel lines. Ask for the new Catalog 36.

TAYLOR FORGE & PIPE WORKS

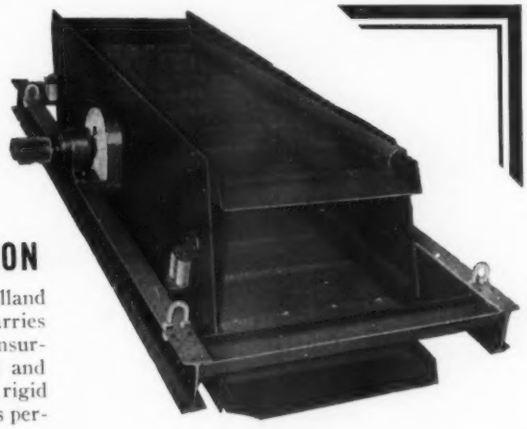
General Offices and Works: Chicago
P. O. Box 485
New York Office: 50 Church Street

TAYLOR *Spiral* PIPE

ASK FOR CATALOG 36

BALANCED VIBRATION

The centrally located New Holland screen vibrator mechanism carries the screen frame in balance, insuring even vibration with rapid and uniform grading. Special rigid housing construction maintains perfect bearing alignment.



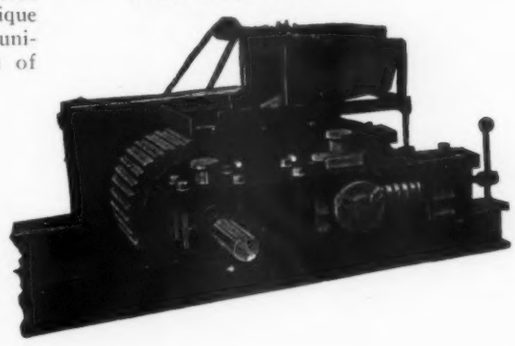
Furnished in all standard sizes—one to three decks.

• • •

INCREASED PRODUCTION

New Holland Roll Crusher with patented pulsating feeder gives double the usual capacity. Unique roll crushing action produces uniform material with minimum of dust and fines.

Built in all capacities up to 100 tons of crushed rock per hour.



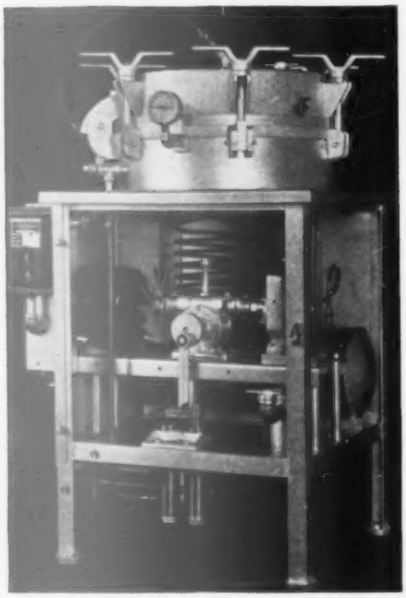
NEW HOLLAND MACHINE CO.,
New Holland, Pa.

New Machinery and Supplies

• Oil Reclaimer

The new Hilco oil reclaimer is a simple and economical means of purifying all types of lubricating oils so that they will again be as good as new oil.

By a process of filtration, through a highly effective filtering medium being marketed under the trade name of Hilite, all the solid matter, sludges, carbon, abrasives and acidity are removed to produce a clear filtered oil. By a simple process of evaporation, moisture and fuel dilution are removed to restore the viscosity or body to the oil.



Device for purifying used oils.

The Hilco is all-electric and automatic in operation and is finding a ready field among the users of all types of gasoline, gas and Diesel engines. It is also used to reclaim oil from air compressors, vacuum pumps, trucks, tractors and stationary engines.

It is claimed that an installation will reduce new oil purchases anywhere from 50 to 75 per cent., and furthermore, the low cost of the reclaimed oil in many cases will permit the operators to change their oil more frequently to prolong engine life and reduce maintenance costs. These reclaimers are made in various sizes, ranging from 12 to 1200 gal. per day.

An interesting booklet, "Oil Reclamation," is available from the manufacturer, the Hilliard Corp., 90 Fourth St., Elmira, N. Y.

• Haulage Unit

The Oshkosh four-wheel-drive earth mover, one of the newest developments in a utility tractor, is used principally in combination with self-filling scrapers. The tractor, however, is equally efficient for the handling of end- and bottom-dump trailer wagons which can be attached similarly to the scraper attachment, requiring approximately one hour for changing from one type of equipment to the other.

The tractor is equipped with a 176-hp. Diesel engine, 12 forward and 3 reverse speeds, combination hand- and air-power steer, applied to all four wheels through a new type steering geometry on which patents are pending.

The new method of handling dirt is to use this new earth mover with scraper and a large tractor to assist in filling. The scraper has a rated capacity of 16 cu.yd. The tractor has a speed of up to 35 miles per hour with brake equipment applied to all six wheels. The scraper is cable controlled.

The above spreader for agricultural lime is being marketed by the Smith Rotary Weigher Co., Springville, Ia. It consists of a cylindrical mixing drum mounted on a truck, a conical spinner spreading the material which is fed from the drum by a screw. This new spreader-spinner is said to give uniform full-circumference spread, the width of which is controlled by adjustable spreader ribs on the lower face of the cone. It is also recommended for spreading sand or calcium chloride on highways, and for similar purposes where an even distribution of fine materials is required.

The new earth-mover in action.

PERFORATED METAL SCREENS

FOR SAND, GRAVEL STONE, ETC.

Manufactured exactly to your specifications.

Any size or style screen, in thickness of steel wanted with any size perforation desired.

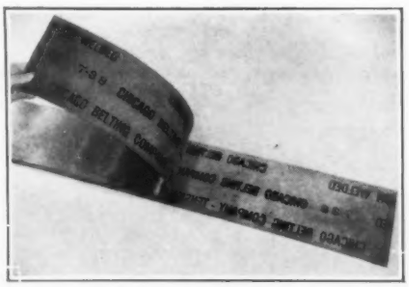
We can promptly duplicate your present screens at lowest prices.

Prompt Shipment

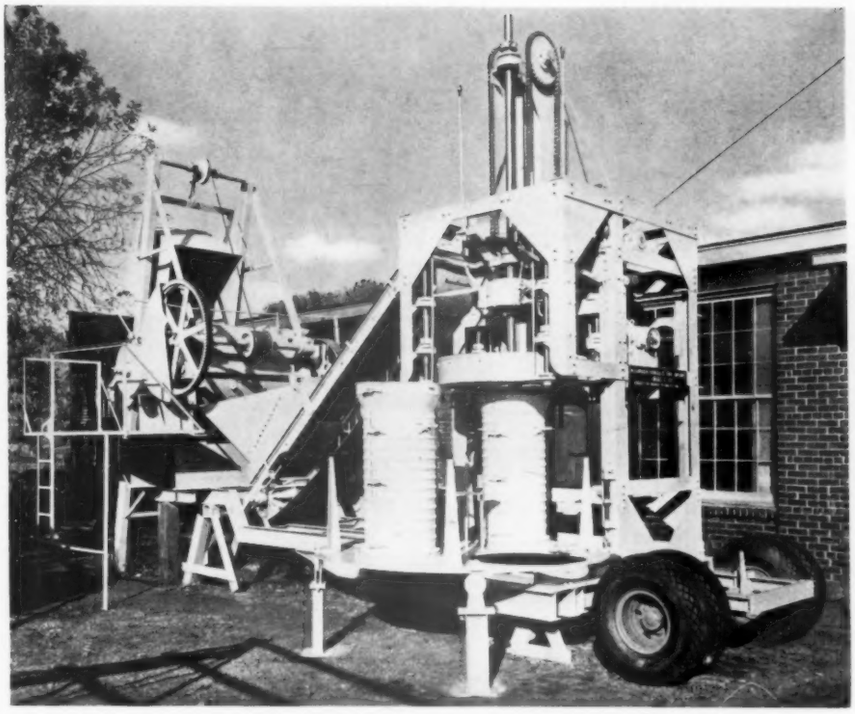
CHICAGO PERFORATING CO.

2435 W. 24TH PLACE CHICAGO, ILL.

Telephone CANAL 1459



The Chicago Belting Co. now brands all its double belts with a "between-the-ply" brandmark claimed to be the first permanent branding ever devised for double leather belts. When a belt gives outstanding service the user, very naturally, wants another belt just like the "old one." The name is printed on the inside of the belt as the double belt goes through the tension cementing machine where the two plies are cement welded together under tension to eliminate belt stretch.



This plant allows the making of pipe on the job.

• Portable Pipe Plant

The Concrete Pipe Machinery Co., Sioux City, Ia., makers of the Dual Packer-Head concrete-pipe machine, being used by 44 domestic and 25 foreign pipe manufacturers, has recently announced a portable unit which is placed on a specially-designed trailer from which it can be both transported and operated.

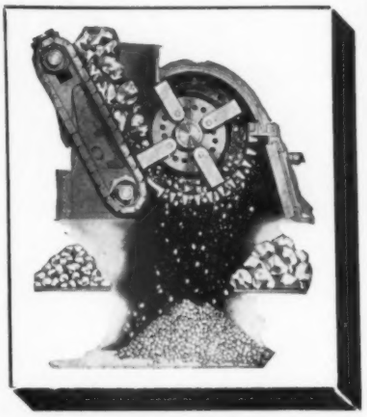
The permanent objective is to take the transportation factor out of the cost of sewer pipe in sizes 4-in. to 36-in. The company feels it is particularly timely now because many jobs are financed by W.P.A. and this equipment permits carrying on storm- and sanitary-sewer jobs with local labor and local materials. Few permanent improvements and really worthwhile jobs are comparable with sewer work from the standpoint of offering jobs to the unemployed. Making the pipe at home and laying them in a ditch line excavated by their own jobless appeals to city officials and the tax-payer alike. It gives more jobs and leaves 85 c. out of every dollar spent at home.

Proper supervision and machine-made quality pipe are assured to the user because the machine is available only to experienced manufacturers using the same equipment in their own permanent and fixed plants. No plant is needed, but effective curing is accomplished by using tarpaulin enclosures that protect the pipe from sun and drying winds. They are sprayed at regular intervals for 48 hours. Pipe can be made from May 1 to November 30 in the northern states and the year around in the southern states.

• Excavator

The growing popularity of truck-mounted shovels and cranes has created a demand for a heavier machine on wheels, and to meet this demand, Bay City Shovels, Inc., Bay City, Mich., has announced the development of a new, heavy-duty, ¾-cu.yd. full-revolving, mobile truck-shovel-crane designated as Model 18.

The new truck-mounted crane.



DIXIE

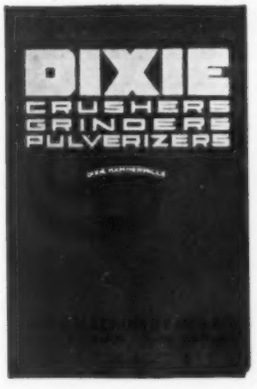
NON-CLOGGING

HAMMER MILL

• FORTY • SIZES •

• is the only crusher with a super-tough moving breaker plate that is 26 times the average area. The result is maximum crushing power with minimum maintenance. That is why DIXIE gives record low costs in producing uniform, cubical material.

Built in 40 different sizes for all requirements in Primary, Secondary and Fine Reduction. Write for your copy of the Dixie Catalog, which gives full details and specifications.



DIXIE MACHINERY MFG. COMPANY

4209 Goodfellow Ave., St. Louis, Mo.

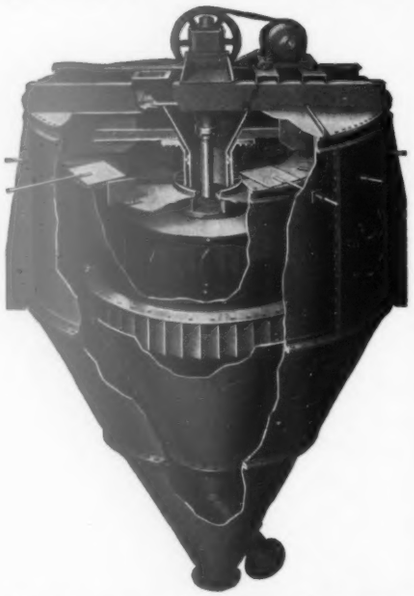
MANGANESE STEEL CASTINGS

for—

· Pulverizers ·
· Conveyors ·
· Crushers ·
· Dredges ·
· Shovels ·
· Screens ·
· Cranes
· Rolls ·

The Frog, Switch & Mfg. Co. CARLISLE, PA.

STURTEVANT



AIR SEPARATORS

are the modern means of producing extremely fine products and increasing Mill capacities. Tell us of your problem.

STURTEVANT MILL CO.
Harrison Square, BOSTON, MASS.

Bagged material being handled by sectional conveyor.

To obtain this capacity, the manufacturer recommends a truck having a gross rating of 50,000 lb., equipped as 6-wheeler with dual drive.

Here is a machine that provides wider working ranges and safer crane loads on truck-mounted units. The upper revolving turntable and roller path of large diameter with internal ring-gear are of unit-cast nickel manganese steel, reducing unnecessary dead weight but retaining all the advantages of one-piece castings to absorb shock and vibration and to give stability.

The liberal use of anti-friction bearings on all machinery shafts and in boom sheaves reduces power loss and assures maximum developed horse-power through quiet, smooth-operating helical gears. All clutches and brakes are of the external contracting band type providing for easy adjustment and replacement of standard width lining. Hoist and auxiliary hoist are "E-Z" control booster-operated to reduce operator fatigue.

Other features include a positive swing lock, securing the rotating base in any position of 360 deg. and patented electric dipper trip for shovel operation and self-locking boom hoist which raises and lowers boom under power. The cab is made of heavy 10-gage formed sheets providing ample room for operation and completely inclosing all machinery. Shatter-proof safety glass is used for protection and safety of the operator.

This machine with a swing speed of 5 r.p.m. is equipped with standard 30-ft. boom of heavy structural lattice-type construction. Special alloy steel booms can be furnished with removable sections up to 80 ft. for high reach. Additional details may be had by writing direct to the manufacturer and asking for Bulletin 18.

• Conveyor

Efforts of cement, lime and gypsum manufacturers to reduce their handling costs may be materially aided by the adoption of an entirely new type of portable, flexible, power-driven conveyor and stacker known as the Clark RopeVeyor. This equipment handles unit loads up to 250 lb., in cotton, jute or paper bags, cartons, cases, boxes, crates, bundles or bales. It is claimed to be capable of reducing handling costs to 10 c. per ton or lower, including power costs, loading the commodity on the RopeVeyor, transporting it and unloading into freight car, ship or warehouse.

The RopeVeyor is designed to operate at speeds of 66 ft., 96 ft. or 132 ft. per minute, handling up to 75 tons per hour, depending upon the number of men at loading and discharge ends. It is said to be particularly efficient in conveying and piling bagged material. Paper bags and cloth bags containing slippery material are easily carried up 70 per cent. grades, while materials packed in jute bags negotiate 90 per cent. grades. White bags stay clean if the conveyor is wiped clean before the start of the operation.

The equipment is made up of 8-ft. sections coupled together and driven by a power head which may be placed at either end of the line or between any two sections, in no case interfering with the smooth flow of material. One power head serves six sections, comprising one assembly, and any number of assemblies may be connected together to form a conveyor of any desired length. Sections are mounted on 3-in. swivel casters, making the whole assembly mobile. Universal joints and clearances between sections permit a turn between sections of as much as 15 deg. so that three such changes of direction achieve a right angle turn. Also sections may be turned up or down 15 deg.

Sections weigh 220 lb. each and are easily moved. Adjustable stands are available for raising the RopeVeyor as high as 8 ft. for stacking. Material may be carried up grades as great as 90 per cent.

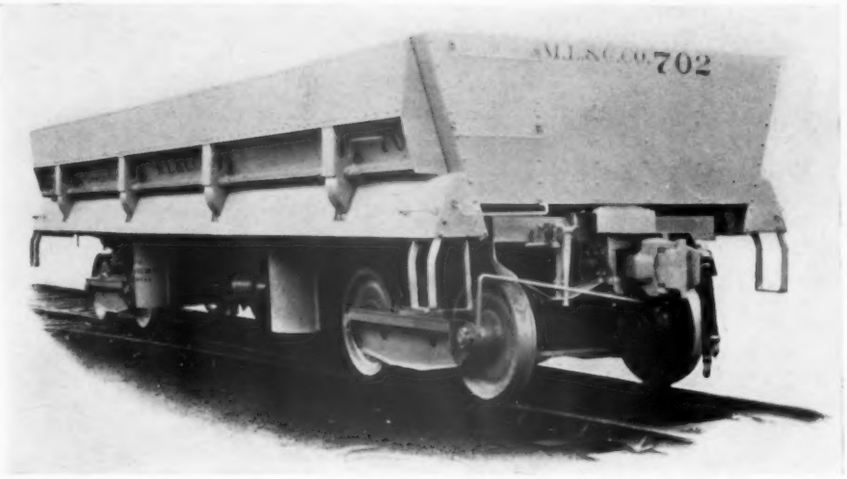
Each section consists of four endless V-belts traveling in parallel steel channels and running over multiple sheaves at each end. One end idling, the other driven by gears running in oil. Each 8-ft. section is individually driven from center line shaft by separate gear head. The V-belts, spaced to give the conveyor a total outside width of 15 in., have corrugated surfaces to carry the load up steep inclines. Belt depreciation is figured at less than two mills per ton carried.

Power is furnished by a 5-hp. motor, which is ample to drive an assembly of six sections and power head when loaded to capacity. On many installations as many as eight or ten sections may be run with a single power head. The RopeVeyor is a product of Clark Tructractor, Battle Creek, Mich.

• Air-Dump Car

The accompanying illustration shows a 30-cu.yd. air-dump car which has gone into the service of the Michigan Limestone & Chemical Co. It has a number of unusual features, being constructed of high-tensile-strength, lightweight alloy steel. It is manufactured by the Differential Steel Car Co., Findlay, O.

Differential air-dump cars employ the double fulcrum principle in which the dump body is supported in stable equilibrium on



Lightweight dump car with "axle-less" trucks.

widely spaced fulcrums or trunnions. Therefore, there is no rocking or swaying of the body during transport, and the stability of the Differential car prevents derailments, spilling of the load in transit, and promotes safety.

The double-fulcrum principle entirely eliminates the locking mechanism which in turn eliminates the major part of dump-car ailments. There is no possibility of accidental dumping. The body dumps to either side with equal facility and the doors open and close automatically and selectively. The double-fulcrum principle further allows extreme low height which is important in loading.

The dumping action is quick and sure, but the telescoping air cylinders are so arranged that the end of the dumping stroke is cushioned by air trapped in the cylinders. Therefore, there is no injurious shock at the end of the dumping stroke to derail the car, damage the track structure, or the car itself.

The door-operating mechanism is beneath the floor of the car and is protected at all times from dirt and damage. It is constructed so that the door without damage will float on any obstruction met during the dumping operation. The downfolding door combined with the double fulcrum principle casts the load well away from the track keeping the track clear.

Operation of a small valve handle is all that is necessary to dump a car. Cars dump to either side and may be arranged so that an entire train may be dumped from a locomotive or any one car in the train. There is no chance for accidental dumping due to leaky valves.

The Differential Axless truck is said to be superior in its operation and far reaching in its economies. Briefly described, it consists of wheels mounted in pairs in tandem. In other words, the two wheels of a pair run on the same rail; each wheel rotates independently of the other wheels. The weight of the car is carried at a point directly between the two wheels of a pair, that is, directly over the rail.

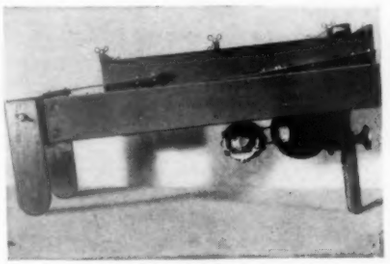
• Motors Tagged

Because so many electrical maintenance men periodically dismantle motor ball-bearings to clean out old grease, a red tag is now attached to Westinghouse grease-lubricated ball-bearing motors stating that this practice is unnecessary. The motor bearings are self cleaning, being provided with an overflow sump into which the used grease is automatically deposited.

On the tag, a cross section of a bearing shows how fresh grease forces the old into the sump. Excess or used grease is easily removed through an opening equipped with removable plug. The overflow sump also provides a pressure relief which prevents overgreasing when the simple instructions accompanying the motor are followed.

This information had been contained in the instruction booklet accompanying each motor, but a survey of installations has shown that the older practice is still prevalent. The red tag is expected to earmark each motor so that all maintenance men will soon know that improved design saves them a good many hours work annually.

The Louis Allis Co., Milwaukee, Wis., announces a brand new line of permissible type d.c. explosion-proof electric motors. These new motors have been inspected and explosion-tested by the Bureau of Mines Laboratory and have also been tested, listed and approved by the Underwriters' Laboratories.

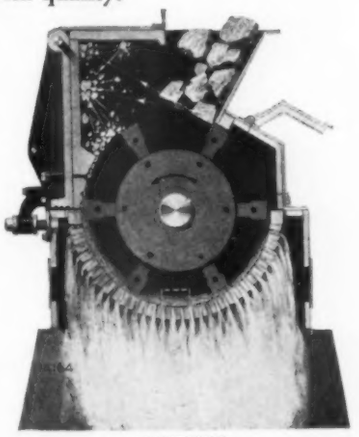


This small Vibroplane screen, having a nominal screening area of 12 in. by 24 in., was developed by the Ajax Flexible Coupling Co., Westfield, N. Y., especially for those operations where close separations of relatively small quantities of material are desired. The machine is regularly equipped with a dust-tight, easily-removable cover, and beaded inlet and outlet spouts allowing the use of dust-tight connections to and from the machine, if the nature of the product makes this desirable.

YEARS

OF EXPERIENCE AND SKILL

. . are reflected in Jeffrey units for processing and handling in the stone products industry. Since 1877 Jeffrey has been building material handling and reduction equipment . . has developed up-to-the-minute engineering facilities to provide crushers, elevators, conveyors, feeders, chains, screens, washers, loaders and unloaders which will assure a steady output, a finished product of uniform quality.



(PATENTED)

Jeffrey Type B swing hammer pulverizer which reduces through a series of distinct steps, the greater part of the reduction being done in the upper chamber before material reaches the screen bars.

Jeffrey engineers build into their product reliability under severe conditions — are skilled in fitting the various units to flowsheet requirements. They will furnish equipment to give you the least possible trouble in operation and maintenance.

For the sake of economy and efficiency . . for dependable day-in and day-out service . . call on Jeffrey.

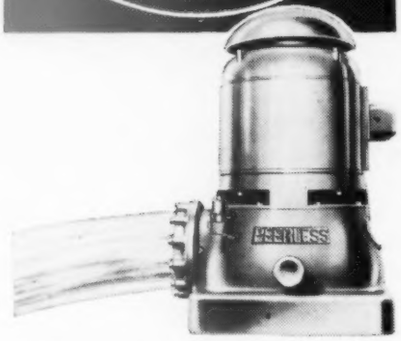
Reg. U. S. Pat. Off.

THE JEFFREY MFG. COMPANY

917 99 N. FOURTH ST • COLUMBUS, OHIO

LOOK FOR THIS SEAL

PEERLESS PUMPS



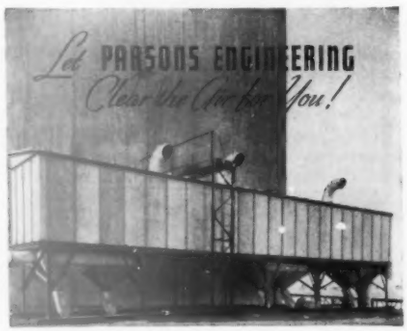
The name that stands for leadership in the deep well pumping field

PEERLESS PUMPS

FOOD MACHINERY CORPORATION

300 Walnut Ave., Massillon, Ohio

Los Angeles, California San Jose, California



A 15-year record of repeat business would imply that sound Parsons engineering is worthy of *your* investigation, too. Parsons' patented oval bag principle, long life, low dust count and minimum maintenance enable Parsons Dust Arrestors to excel in the cement industry. Write for our Bulletin DA-6.

PARSONS

PARSONS
ENGINEERING CORPORATION
3597 E. 82nd St. • Cleveland, Ohio

Vacuum control is a feature of this new excavator.

• Excavator

Three outstanding new features which meet all modern digging requirements are incorporated in the new Marion Type 352 excavator recently developed by the Marion Steam Shovel Co., Marion, O., and designed to handle jobs on which high speed, strength and smoothness of operation are necessary, as well as power and durability. As a shovel, it is equipped with a 1¼-cu.yd. dipper. These new features are: "velvo-grip" hoist and crowd clutches; vacuum-controlled dipper trip, and vacuum-controlled rotating clutches.

The velvo-grip hoist and crowd clutches enable the operator to have the "feel of clutch" at all times, assuring smooth handling and accurate spotting of loads. This feature is especially valuable when the Marion is equipped for steel erection and other crane work.

With the vacuum-controlled dipper trip the shovel operator can trip the dipper without removing his hand from the main lever, for the control valve is mounted on the main lever. This feature permits speedier and easier operation.

A single lever at the operator's station opens and closes vacuum valves controlling the rotating clutches, which are of the cone type. Experience has shown that this type clutch provides thoroughly reliable service. The rotating clutch shaft is mounted on anti-friction bearings. Bevel gears are enclosed in a cast-steel oil-tight case.

The general machinery is compactly arranged and readily accessible to provide easy maintenance and operating simplicity.

In addition to the features already enumerated, the Type 352 provides self-cleaning, non-clogging crawlers, independent chain crowd and other outstanding Marion developments.

The cab provides adequate room for the operator and oiler to reach and service the general operating machinery. Ample windows provide wide range operating visibility.

Easily convertible into a crane, clamshell or pull shovel, the excavator is powered by gas, Diesel or electric motors. For the gas and Diesel powered shovels, a 100-gal. capacity fuel tank is provided.

Under ordinary working conditions this new Marion has a travel speed of nearly a mile an hour. Its rotating speed is 3.74 complete revolutions a minute.

• Front-End Bumper

To increase scraper yardage and reduce loading time, the Allis-Chalmers Manufacturing Co. has designed a front-end bumper for its Model L-O tractors to be used for pushing tractor-scraper outfits while loading.

Already a number of these pusher-equipped L-O tractors are in use. Time studies on several jobs show they increase payloads two and three cubic yards per trip, cut loading time in half and raise the daily output per scraper from a third to half. Users figure use of the pusher will reduce tractor repair costs materially by relieving the pulling tractors of much of the twisting and jerking strains customary to loading. One pusher tractor can handle from three to five tractors and scrapers, depending on the length of haul.

In addition to increased yardage and repair savings, Allis-Chalmers believes the use of the pusher will cut down operator fatigue by reducing the amount of gear shifting and steering clutch work now required to load scrapers where no pusher is used. Its use also provides an extra tractor for emergencies such as pulling equipment out of mudholes, boosting trucks and scrapers up steel ramps, etc.

The Allis-Chalmers bumper is spring cushioned and mounted inside the truck frames in such a manner that the push is on the rear

Scraper with pulling and pushing tractors in operation.

end of the tractor. The bumper has a face 36 in. by 32 in., so contact with the scraper bumper can be made easily and quickly without shock. Though designed primarily for use with Gar Wood scrapers, Allis-Chalmers bumper equipped tractors can be used for the loading of any big capacity scraper fitted with a rear bumper.

INCORPORATIONS

Olson Concrete Co., 1718 S. 8th Ave., Maywood, Ill. Incorporators: C. R. Olson, H. J. Olson and A. Olson.

Cleveland Sand & Gravel Co., Liberty, Tex. Capital, $50,000. Incorporators: Noble Garvey, T. F. Ryan and R. E. Biggs.

D'Alessio Bros. Concrete Corp., New York, N. Y. Lancelot Armstrong, 110 E. 42nd St., correspondent.

Nashua Valley Crushed Stone Co., Inc., Fitchburg, Mass. 100 shares n.p.v. Incorporators: E. H. Dudley, Frances M. Donahue, Dorothy P. Nelson.

Delaware Concrete Products Co., Glasgow, Del. Capital, $25,000. Incorporators: D. V. Culver, M. E. Verner and E. T. Rettew.

Crapo Gravel Co., Swartz Creek, Mich. $9,000 capital stock. Incorporators: Stanford Crapo (Detroit), James Steele, Jr. (Swartz Creek) and Victor Mikan (Durand).

Pearce Limestone Corp., Gifford, Ia. Capital, $10,000. Incorporators: Harry R. Pearce and Ilo Pearce.

The Clapp Machinery Co., Groton, N. Y., has been appointed distributor for county and township sales in the central portion of New York by the Bucyrus-Erie Co., South Milwaukee, Wis.

The American Rolling Mill Co., Middletown, O., has established a district sales office in Minneapolis with W. A. Danner, formerly connected with the company's Chicago office, as district manager.

Trade Literature

Cedar Rapids Portable Tractor-Crusher Plants. 8 p. (Bulletin RC-2) Iowa Mfg. Co., Cedar Rapids, Ia.

Welding Torches. 30 p. Victor Equipment Co., San Francisco, Cal.

The Merrick Feedoweight. 12 p. (Bulletin 8450) Westinghouse Elec. & Mfg. Co., East

Type TY Reduction Crusher. 22 p. (Bulletin 2112) Traylor Engineering & Mfg. Co., Allentown, Pa.

How B-A Fuses Save Money. 8 p. (Bulletin 8450 Westinghouse Elec. & Mfg. Co., East Pittsburgh, Pa.

Mining Machinery. 40 p. Straub Manufacturing Co., Oakland, Cal.

Water Softeners for Boiler Feed Water Treatment. 16 p. (Bulletin 1850) International Filter Co., Chicago, Ill.

Diesel D-8 Tractor. 32 p. (Bulletin 4876) Caterpillar Tractor Co., Peoria, Ill.

Sludge and Slurry Pumps. 4 p. (Bulletin 173) Morris Machine Works, Baldwinsville, New York.

Model 425 Engine-Driven Compressors. 4 p. Ingersoll-Rand Co., New York, N. Y.

Universal Chain Hoists. 4 p. (Bulletin HH2) McCollum Hoist & Mfg. Co., Downers Grove, Ill.

The Murphy Diesel Co., Ltd., has appointed W. C. Morgan as district sales manager in the Southwest territory. Mr. Morgan will be located at Tulsa, Okla. The W. K. M. Company of Tulsa are agents in the Mid-Continent field.

Statement of Ownership

PIT AND QUARRY

Statement of the ownership, management, circulation, etc., required by the Act of Congress of March 3, 1933, of Pit and Quarry, published monthly at 538 S. Clark Street, Chicago, Ill., for October 1, 1938.

State of Illinois, County of Cook, ss.

Before me, a notary public in and for the state and county aforesaid, personally appeared H. W. Baumgartner, who, having been duly sworn according to law, deposes and says that he is the business manager of Pit and Quarry, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 411, Postal Laws and Regulations, printed on the reverse side of this form, to-wit:

1. That the names and addresses of the publisher, editor, managing editor, and business manager are:

Publisher, Complete Service Publishing Co.; Editor, S. A. Phillips; Business Manager, H. W. Baumgartner, all of Chicago, Ill.

2. That the owner is Complete Service Publishing Co., Chicago, Ill. That the stockholders owning 1% or more of the total amount of stock are: H. W. Baumgartner, I. A. Baumgartner, S. A. Phillips and Evelyn W. Montgomery, all of Chicago, Ill.

3. That there are no bondholders, mortgagees, or other security holders owning or holding 1% or more of total amount of bonds, mortgages or other securities.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest, direct or indirect, in the said stock, bonds, or other securities than as so stated by him.

H. W. Baumgartner,
Business Manager.

Sworn to and subscribed before me this 21st day of September, 1938.

(Seal)

Michael Motto,
Notary Public.

My commission expires Aug. 2, 1941.

PYRASTEEL
for high temperatures
EVANSTEEL
for hard service

WILL LOWER YOUR COST PER BARREL

Liner plates of latest design in Pyrasteel for the Vanderwerp recuperator

COOLING EQUIPMENT

For all makes of cooling equipment, PYRASTEEL gives unequalled service at temperatures up to 2000°.

Vanderwerp recuperators now using PYRASTEEL liners are giving superior results with reduced costs.

KILN ENDS

Kiln ends made of PYRASTEEL are designed for continuous service at high temperatures, 1950° F and provide the most economical means of saving fuel.

Consult our Cement Mill Department

A practical knowledge of cement mill operating problems often enables us to make recommendations for the use of PYRASTEEL and EVANSTEEL which have resulted in improvements in operating methods, thus cutting the cost per barrel.

CHICAGO STEEL FOUNDRY CO.
Makers of Alloy Steel for Over Twenty-five Years
Kedzie Ave. at 37th St.
CHICAGO, ILLINOIS

ERIE

DREDGING PUMPS

DEFINITELY
Longer service life
Longer term economy
Low maintenance costs
Lasting satisfaction

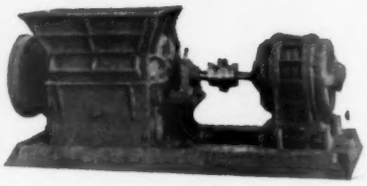
Specify ERIE Pumps for sand and gravel production. Sizes 4" to 18" discharge: 14 to 300 cu. yd. capacity; heads to 125 feet.

Write for Bulletin

ERIE PUMP & ENGINE WORKS
153 GLENWOOD AVE. MEDINA, N. Y.

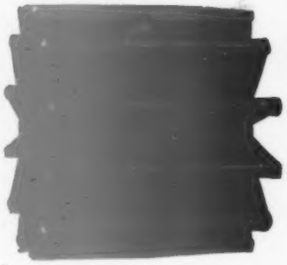
Specify AMERICAN for every crushing job

You will be sure of greater tonnage of uniform products at lower cost and long, trouble-free service. Every part is carefully selected and tested to assure maximum endurance and quality. AMERICAN Features: Manganese lined crushing chamber; cast steel adjustable plates; heavy alloy steel shaft; SKF roller bearings.



Write for complete details

AMERICAN PULVERIZER COMPANY
1289 MACKLIND AVE. ST. LOUIS, MO.



CONVEYORS LAST LONGER

where SPROUT-WALDRON Wing Pulleys are used. The same is true of your Elevator belts.

Material conveyed cannot lodge between belt and pulley to cut your belts.

Interchangeable with standard pulleys.

Write for catalog

SPROUT, WALDRON & CO., INC.
1221 SHERMAN ST., MUNCY, PA.
Elevating, Conveying and Transmission Equipment

HOTEL PHILADELPHIAN

FORMERLY HOTEL PENNSYLVANIA
DANIEL CRAWFORD, JR., MANAGER
39th and CHESTNUT STREETS
PHILADELPHIA, PENNA.

Our courteous and competent staff will give you the utmost in friendliness, comfort and service. Conveniently located to all stations, and only five minutes away from the heart of the business section.

600 ROOMS each with bath from $2.75 up

Lounge and Restaurants *Unrestricted Parking to 3 A.M.*

PIT AND QUARRY

Research Department
538 South Clark St., Chicago, Ill.

Please send me catalogs and prices concerning the following items checked below:

- ☐ Agitators, sand and Gravel
- ☐ Agitators, Slurry
- ☐ Aggregate — Bituminizing Plants
- ☐ Air cleaners
- ☐ Air compressors
- ☐ Asphalt Mixing Plants
- ☐ Asphalt Mixers
- ☐ Bag fillings nd weighing machinery
- ☐ Bags, cloth
- ☐ Bags, paper
- ☐ Balls, steel
- ☐ Barges, steel
- ☐ Belt Dressing
- ☐ Belt fasteners
- ☐ Belting, conveyor and elevator
- ☐ Belting, transmission
- ☐ Belt lacing
- ☐ Belt plates
- ☐ Belt rivets
- ☐ Belt tighteners
- ☐ Bin gates
- ☐ Bins, concrete
- ☐ Bins, steel
- ☐ Blasting supplies
- ☐ Blasting powder
- ☐ Blocks, friction
- ☐ Boats, self-unloading
- ☐ Bodies, Motor Trucks
- ☐ Brake Linings
- ☐ Buckets, Clamshell
- ☐ Buckets, Conveyor and Elevator
- ☐ Buckets, Dragline
- ☐ Buckets, Orange Peel
- ☐ Cableways, Slackline
- ☐ Calcining Machinery
- ☐ Car Dumpers
- ☐ Car Pullers and Movers
- ☐ Carriers, Belt
- ☐ Cars, Dump
- ☐ Cars, Kiln
- ☐ Castings, Manganese Steel
- ☐ Castings, Steel
- ☐ Chains, Conveyor and Elevator
- ☐ Chains, Power Shovel, Crane and Dredge
- ☐ Chains, Transmission
- ☐ Chutes
- ☐ Classifiers
- ☐ Clips, Wire Rope
- ☐ Clutches
- ☐ Clutches, Magnetic
- ☐ Concrete Plants, Ready Mixed
- ☐ Cones, Washing
- ☐ Conveyors, Apron
- ☐ Conveyors, Belt
- ☐ Conveyors, Pneumatic
- ☐ Conveyors, Screw
- ☐ Conveyors, Skip
- ☐ Coolers
- ☐ Couplings, Flexible
- ☐ Couplings, Hose
- ☐ Cranes, Locomotive
- ☐ Cranes, Overhead Traveling
- ☐ Cranes, Truck
- ☐ Crushers, Cone
- ☐ Crushers, Disc
- ☐ Crushers, Gyratory
- ☐ Crushers, Hammer
- ☐ Crushers, Jaw
- ☐ Crushers, Ring
- ☐ Crushers, Roll
- ☐ Crushers, Rotary
- ☐ Cutter Heads, Dredging
- ☐ Derricks
- ☐ Draglines, Cableway
- ☐ Draglines, Revolving Boom
- ☐ Dredges, Dipper
- ☐ Dredges, Hydraulic
- ☐ Dredges, Ladder
- ☐ Drill Sharpening Machinery
- ☐ Drills, blast hole
- ☐ Drills, Diamond Core
- ☐ Drills, Hand Hammer
- ☐ Dryers, Rotary
- ☐ Dryers, Sand and Gravel
- ☐ Dust Collecting Systems
- ☐ Dynamite
- ☐ Elevators, Bucket
- ☐ Engines, Diesel
- ☐ Engines, Gas
- ☐ Engines, Gasoline
- ☐ Engines, Hoisting
- ☐ Engines, Oil
- ☐ Feeders
- ☐ Filters, Air
- ☐ Filters, Oil
- ☐ Fire Brick
- ☐ Flanges, Pipe
- ☐ Frogs and Switches
- ☐ Fuses, Blasting
- ☐ Gears
- ☐ Goggles
- ☐ Governors
- ☐ Grinding Balls
- ☐ Grizzlies
- ☐ Guns, Hydraulic
- ☐ Hoists, Air
- ☐ Hoists, Derrick
- ☐ Hoists, Drum
- ☐ Hoists, Motor Truck Body
- ☐ Hoists, Skip
- ☐ Hose, Air, Stream, Water
- ☐ Hose, Sand Suction
- ☐ Hydrators
- ☐ Kettles, Calcining
- ☐ Kilns, Rotary
- ☐ Kilns, Vertical
- ☐ Lime Putty Plants
- ☐ Linings, Kiln
- ☐ Loaders, Portable
- ☐ Loaders and Unloaders Box Car
- ☐ Locomotives, Diesel
- ☐ Locomotives, Gasoline
- ☐ Locomotives, Steam
- ☐ Log Washers
- ☐ Lubricants
- ☐ Measuring Devices
- ☐ Mills, Compartment
- ☐ Mills, Tube
- ☐ Mixers, Plaster
- ☐ Motors, Electric
- ☐ Motors, Gasoline
- ☐ Motor Trucks
- ☐ Motor Trucks, Ready-Mixed Concrete
- ☐ Nozzles, Hydraulic Mining
- ☐ Nozzles, Gravel Washing
- ☐ Nozzles, Spray
- ☐ Nozzles, Dust Settling
- ☐ Nozzles, Suction Hose
- ☐ Nuggets, Grinding Perforated Metal
- ☐ Poidometers
- ☐ Pulleys, Clutch
- ☐ Pulleys, Magnetic
- ☐ Pulverized Fuel Systems
- ☐ Pulverizers, Ball, Conical Pebble
- ☐ Pulverizers, Disc
- ☐ Pulverizers, Hammer
- ☐ Pulverizers, Ring
- ☐ Pulverizers, Rod
- ☐ Pulverizers, Roll
- ☐ Pumps, Centrifugal
- ☐ Pumps, Deep Well
- ☐ Pumps, Sand and Gravel
- ☐ Pumps, Slurry
- ☐ Pumps, Steam
- ☐ Radiators, Engine Cooling
- ☐ Rails
- ☐ Refractories
- ☐ Respirators
- ☐ Rollers, Conveyor
- ☐ Rolls, Crushing
- ☐ Rope, Wire
- ☐ Safety Appliances
- ☐ Sand-Lime-Brick Machinery
- ☐ Scales, Track
- ☐ Scales, Truck
- ☐ Scrapers, Dragline
- ☐ Screens, Revolving
- ☐ Screens, Shaking
- ☐ Screens, Vibrating
- ☐ Separators, Air
- ☐ Separators, Dry Centrifugal
- ☐ Separators, Magnetic
- ☐ Shovels, Gasoline
- ☐ Shovels, Steam
- ☐ Skips
- ☐ Sleeves, Dredge
- ☐ Slugs and Nuggets, Grinding
- ☐ Speed Reducers and Gears
- ☐ Spray Nozzles
- ☐ Sprays, Paint
- ☐ Sprockets
- ☐ Steel, Tool
- ☐ Stokers
- ☐ Switches, Track
- ☐ Tanks, Concrete and Steel
- ☐ Tanks, Sand Settling
- ☐ Tanks, Wood
- ☐ Thickeners, Slurry
- ☐ Track, Portable
- ☐ Track Shifters
- ☐ Tractors, Crawler
- ☐ Tramways, Aerial
- ☐ Trippers, Belt
- ☐ Trippers, Tramway
- ☐ Unloaders
- ☐ Valves, Pump
- ☐ Washers and Scrubbers, Sand, Gravel, Stone
- ☐ Weighers, Automatic
- ☐ Welding Supplies
- ☐ Wheels, Car
- ☐ Winches
- ☐ Wire Cloth
- ☐ Wire Cloth, Manganese Steel

To be used for.....

Firm Name.....*Individual*.....

Address.....*City*.....*State*.....

Announcing . . . . . **THE**

CONCRETE INDUSTRIES YEARBOOK

For many years Pit and Quarry Handbook (published annually) has been the standard reference work of the aggregates industries. During recent years these industries have extended their activities into related lines and from time to time the Handbook has been enlarged by the insertion of new chapters dealing with these new products.

To-day the aggregates industries produce a very large share of the ready-mixed concrete manufactured in this country and they are responsible for an ever-increasing portion of the output of concrete units. In recognition of the latter fact for more than a year a large section of Pit and Quarry has been devoted to concrete-units production and selling methods. And now, in the 1939 edition of Pit and Quarry Handbook, out in January, a new chapter will discuss in great detail the entire subject of concrete units.

As every producer in the aggregates industries receives a copy of every new edition of the Handbook, this new chapter will be given a wide distribution throughout that field. In order to reach exclusive manufacturers of concrete units or ready-mixed concrete who would not normally receive the complete Handbook, the chapter on concrete units will be published separately as the Concrete Industries Yearbook, and will be distributed in that form to all reputable concrete-products and ready-mixed-concrete producers.

Full information will be furnished on request.

Pit and Quarry Publications

538 South Clark St. Chicago, Illinois

A general view of the Del Balso aggregate-bituminizing plant showing whirley unloading aggregates from barge at left.

Electricity Used Exclusively for Heating at This New York Aggregate-Bituminizing Plant

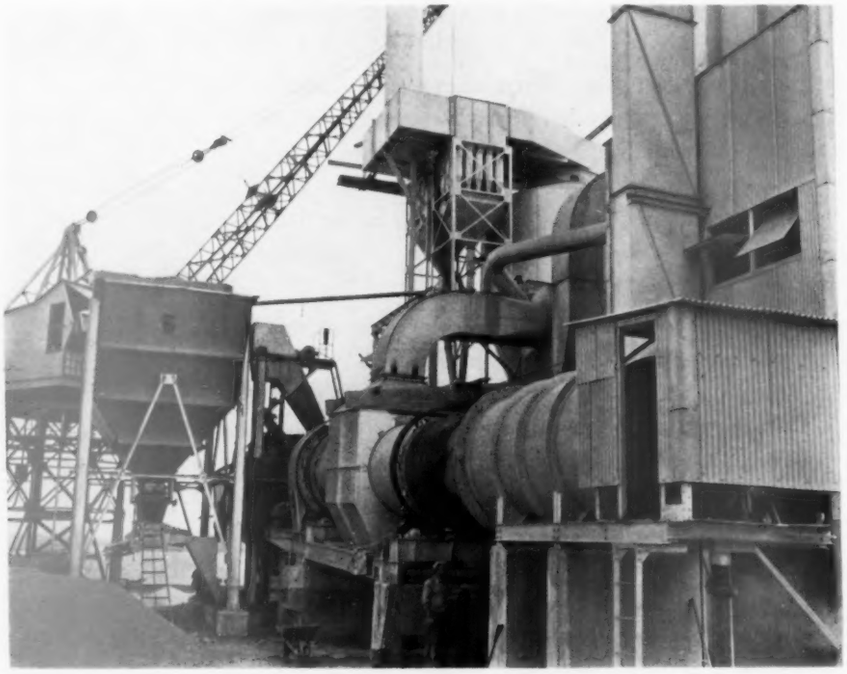
By W. E. TRAUFFER

IN traveling about the country visiting and inspecting operations in the industries covered by PIT AND QUARRY, the writer occasionally encounters a plant which stands out in its field. Such a plant is the one recently put into operation by the Del Balso Asphalt Corp. in the Borough of the Bronx, New York, N. Y. In this plant operations are automatic wherever possible, electric heating is used in place of steam, and there are many other interesting features. This company is an offshoot of the Del Balso Construction Corp., with which is also affiliated the Corbetta Construction Co. Together these companies have in recent years held contracts totaling millions of dollars on the construction of large civic improvement projects in the metropolitan area. This included work on the Triborough Bridge, the Henry Hudson Parkway and Bridge, the Whitestone Bridge, etc.

The plant is located on Westchester Creek in the eastern part of the Bronx and is not far from the northern approach to the Whitestone Bridge, which is now near completion. Both hot and cold mixes are made, but until now most of the output has been New York State Type 3 cold mix for paving paths in city parks. Deliveries can be made to any part of the Bronx or northern Manhattan within a 1-hr. haul.

The plant is built entirely of reinforced concrete and steel with Keasbey & Mattison pressed asbestos siding. Erection was started on May 2 and the plant was in operation on June 15. The McCarter Iron Works had the contract for designing, fabricating and erecting the plant and also supplied most of the equipment. The electric-heating equipment was furnished by the Electric Heating Equipment Co. under the supervision of the McCarter organization.

Another view of the plant. Small bin in foreground is for screen rejects.



The drier with wind chamber, dust-collection equipment and elevator at right. At left are aggregate bin, feeder and elevator.

The aggregates used in this plant—crushed stone, pulverized limestone, and sand—are received in barges. An electric whirley with a 50-ft. boom and a 1½-cu. yd. clam-shell bucket unloads the stone and sand, either to stock-piles or into a 2-compartment feed hopper of 100-ton total capacity. Clam-shell gates control the discharge from these hopper compartments to a Jeffrey-Traylor vibrating feeder, which controls the rate of feed. An elevator feeds these materials into the drier.

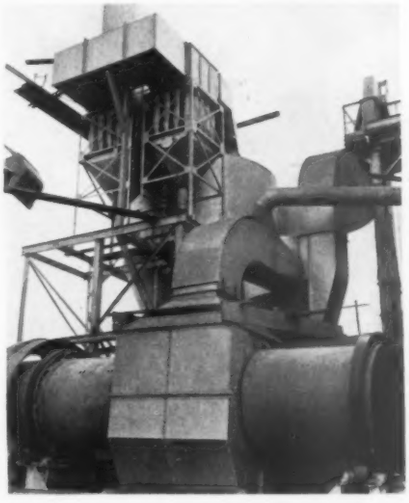
The McCarter-Morris patented drier is 5½ ft. in diameter and 30 ft. long, and has a wind-chamber around the center. The feed end of the drier is equipped with a low-pressure Best burner with a capacity of 100 gal. per hr. The discharge end of the drier has a 200-gal. per hr. Best burner. These burners are of the centrifugal type and mechanically atomize the oil. A Best blower operating at 3,500 r.p.m. sup-

plies air for the burners. SKF heavy-duty self-aligning bearings are used on the drier drive and trunnion rolls.

When producing cold mixtures, only the small burner on the feed end is used. A Buffalo Sirocco size 90E draft fan draws the hot air from the center wind-chamber and also draws cold air through the discharge end of the drier, cooling the aggregates to about 100 deg. F. before they are discharged. When producing hot mixtures, the large burner only is used, unless the aggregates are extremely wet, in which case both burners are used. In this case the aggregates are discharged from the drier at about 400 deg. F.

In all cases the air and dust withdrawn from the drier are blown by the fan into a 14-ft. diameter cyclone, which removes 50 per cent. of the dust. A dual Multiclone separator removes 95 per cent. of the remaining dust.

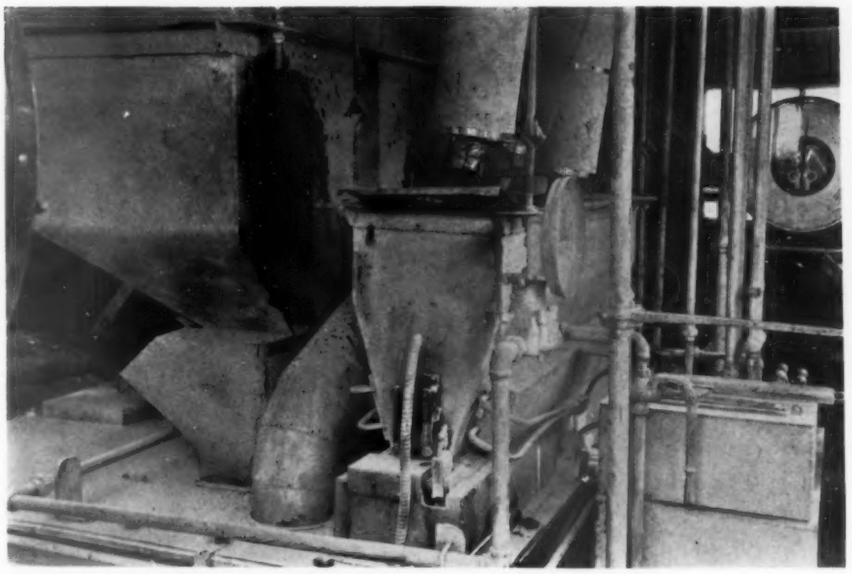
The aggregates are dropped from the drier into the boot of a bucket-elevator, which discharges them on a 2½-deck 4-ft. by 10-ft. Nordberg Symons screen. This screen produces four sizes of aggregates, which are discharged into four



This photograph illustrates passage of dust from drier wind chamber through the fan into the cyclone and dust collector.

bin compartments having a total capacity of 200 tons. For cold mixtures the four sizes produced are: minus ⅛-in.; ⅛-in. to ¼-in.; ¼-in. to ⅜-in.; and over ⅜-in. which is tailings and amounts to less than 1 per cent. of the material. For hot mixtures, sand, ⅛-in. to ½-in., ½-in. to 1-in., and tailings are produced. The tailings go to a small rejection bin or one compartment of the main bin, as desired.

The limestone dust used is pulverized to pass 85 per cent. through 200-mesh and is received in bags. These are unloaded from barges by putting a sling around 10 to 12 bags and lifting them with the whirley to the roof of the dust-storage building. The dust is dumped from the bags through manholes into this building. Dust is reclaimed from storage by manually scraping it with a large hoe into a screw conveyor under the floor. A bucket-elevator discharges the dust through a screw-conveyor into a fifth bin of 15-ton capacity which is a compartment of the main bin. This bin is equipped with a Fuller Co. automatic high- and low-level indicator.



The 2-ton mixer with aggregate batcher and electrically-heated bitumen bucket above. At right are pushbuttons for automatic operation and levers for hydraulic gates.

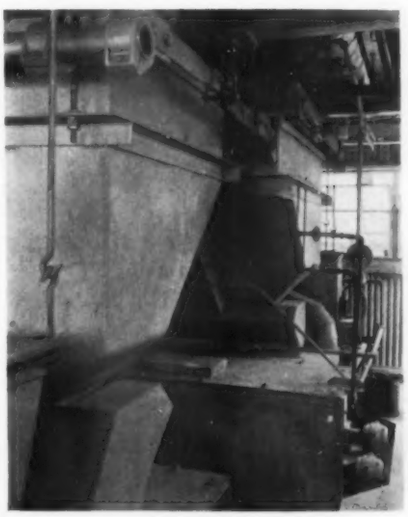
The asphalt used in this plant is received in barges and steam for unloading it is supplied by an 85-hp. boiler at 125-lb. pressure. This is the only place where steam is used in the entire operation. The asphalt is pumped through steam-jacketed lines into four 10-ft. by 42-ft. horizontal all-welded cylindrical steel tanks, which hold 25,000 gal. each. These tanks are insulated with 85-per cent. magnesia blocks and rest on concrete foundations. The asphalts used are usually 50-60 or 60-70 penetration for hot mixtures and 85-100 penetration for cold mixtures.

From this point on all the heating of the asphalt is done electrically. At the bottom of one end of each of these four storage tanks are electric heating elements incased in tubes, from which they may readily be withdrawn from the outside of the tank. These elements were supplied by the Electric Heating Equipment Co.

They heat the asphalt near them to 200 to 250 deg. F., causing it to slump down into the end of the tank and flow out freely. A Bristol pyrometer on each tank automatically keeps the temperature between the desired limits, which are different for each type of asphalt. The smallest possible number of elements is thus used at all times. They are controlled from Trumbull panels.

The hot asphalt flows from any of these four tanks into either of two 4,500-gal. superheaters, each of which is equipped with additional heating elements also supplied by the Electric Heating Equipment Co. These elements are also automatically controlled to raise the temperature of the asphalt to anywhere between 270 and 320 deg. F., depending on the material. For convenience each superheater is used for a different type of asphalt so that two types are always available on short notice.

The hot asphalt is pumped from each superheater by a submerged pump driven through a vertical shaft from a motor mounted above and outside the superheater. Each pump has a separate pipe-line feeding the two mixing and



Another view showing both mixers and their aggregate-weighing batchers.

The electric-vibrating feeder which regulates feed of crushed stone and sand to the drier.

batching systems in the plant. These pipe-lines are also heated electrically to maintain the temperature of the asphalt in transit. The heating is done by electric-heating elements which are wrapped spirally around the pipes. A layer of aluminum foil reflects the heat and a Johns-Manville asbestos pipe covering is a final insurance against radiation losses.

The 1-ton and the 2-ton McCarter pug-mill mixers are located at opposite ends of the mixer floor, and each is served by the same type of equipment. Asphalt for each mixer is weighed in a McCarter "AC" electrically-heated, non-tipping, bottom-discharge bucket. The discharge from these buckets is effected by means of dual perforated plates, one of which is moved so that the perforations coincide to control the discharge.

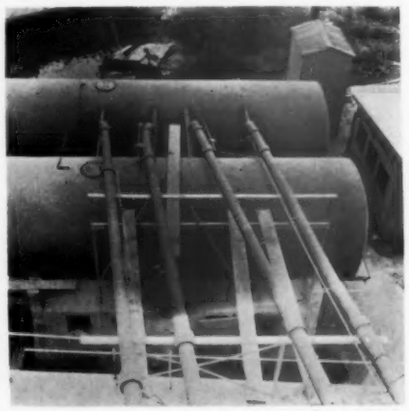
Aggregates are discharged into the two weighing batchers through a hydraulically-operated roller-type gate under each of the 5 bins. A separate set of levers at each mixer controls these gates. Each asphalt batcher and each aggregate batcher has its individual

The 1-ton mixer and the levers controlling the hydraulic gates. Also shown are the batcher and the bitumen bucket with their dial scales.

Kron dial scale. The aggregate and asphalt bucket gates are controlled by small hydraulic levers for the 1-ton mixer. Push-button controls and a timelock system automatically control the operation of the 2-ton mixer on a predetermined mixing schedule which can be set for any desired mixing interval.

When using the 2-ton system, the operator first weighs out the aggregates and asphalt. Upon closing the mixer gate by means of a push-button after discharging a batch, the aggregate weighing batcher automatically opens and discharges its contents into the mixer, beginning a new cycle. After the aggregates have been mixed dry for 2 min. the contents of the asphalt bucket are automatically discharged into the mixer. After another minute of mixing the contents of the mixer are then automatically discharged into a waiting truck, completing the cycle. During this cycle the aggregate and asphalt batcher gates have closed and locked automatically and the operator has weighed out another batch.

This hydraulic control is a new development in this industry and enables the operator to exercise accurate control of all the operations without moving from his position. Suction lines connecting the batchers and mixers to the main dust-collecting system already described keep the mixer floor practically dustless.



Two of the four 25,000-gal. asphalt-storage tanks. Receptacle for electric heating elements is visible at right.

When producing cold mixtures, only the 2-ton mixer is used and this is operated on 3-min. cycles in accord with the New York State Type 3 Specifications. A capacity of 40 tons per hr. has been obtained. When producing hot mixtures, the 2-ton mixer can be used for binder or top and the 1-ton mixer for surface material. A capacity of 100 tons per hr. has been obtained. The 2-ton mixer is direct-driven by a 75-hp. and the 1-ton mixer by a 40-hp. Westinghouse gear-motor.

The Bunker C oil used as fuel in this plant is received in tank trucks and is stored in two 8,000-gal. tanks. A Best preheating system, consisting of electric motors, pumps and electric heating elements, is used to preheat the oil to 130 to 140 deg. F. before feeding it to the burners. A duplicate preheating and pumping system is on hand for emergency use. Individual gear-motor drives and roller-bearings are used throughout the plant.

According to Anthony M. Del Balso, vice-president of the company, the use

The electric pyrometers which automatically control the temperatures in the asphalt storage tanks. Individual heating element controls are below.

of electricity for heating makes it possible to hold temperatures constant within 1 or 2 deg. of the desired point, and also eliminates the licensed engineers necessary to operate the boilers, when steam is used for heating. Considering all the factors involved, electric heating shows a saving over steam in this plant even with the high power rate in effect in this territory.

A batch of bituminized aggregates being discharged from the 2-ton mixer into a truck for delivery.

A PIONEER PRODUCTS FIRM IN GEORGIA

THE Camp Concrete Products Co., of Columbus, Ga., enjoys the double distinction of being one of the pioneer producers of concrete products in this section and of having one of the most efficient and up-to-date as well as photogenic plants in this industry. L. A. Camp, founder of this company, went into the paving-contracting business in 1908 and as a side-line pioneered the manufacture of concrete burial vaults. In 1924 a concrete-pipe plant was built, and in July, 1935, it was replaced with the present plant. In May, 1937, a machine was installed for the manufacture of concrete blocks, which had previously been made by hand. The company continues to do concrete-contracting work and also sells cement, lime, steel sash, etc. in connection with its block sales.

The plant and office are excellent advertisements for the company's products. The office building, erected in 1937, is built of concrete blocks plastered inside and out and has a monolithic-concrete floor. The plant was built of hand-made concrete blocks and has a water-sealed concrete tile roof. A 60-ft. by 100-ft. concrete-block building was recently completed for the manufacture and storage of burial vaults, garden furniture, concrete posts, joists and other specialties. The company has mixed some concrete and delivered it in dump trucks, but has not as yet gone actively into the ready-mixed-concrete business.

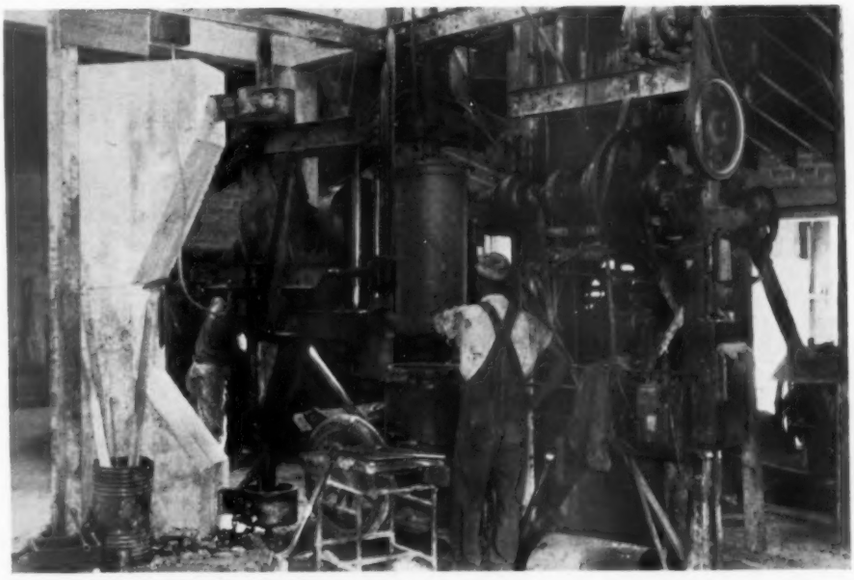
The company pumps most of the sand required out of a creek on its property. Some gravel is also produced but most of this is purchased. A 6-in. Georgia pump and stationary screens are used. Some of the sand is sold. The aggregates are stored in the open and are wheeled in pneumatic-tired barrows into the plant. Eight of these wheelbarrows are used about this plant and in construction work done by the company. It has been found that one man can handle twice as much material as was formerly possible with the old steel-wheeled barrow. Goodrich, Goodyear and Firestone tires are used. In the concrete plant alone the use of pneumatic tires has made it possible to take one man off the crew.

The original machine in this plant is an R & L Concrete Machinery Co. pipe machine which makes from 1,000 ft. of 6-in. pipe down to 300 ft. of 30-in. pipe daily. Concrete for this machine is mixed in a Besser 12-ft. mixer. American Steel & Wire Co. wire is used for the reinforcing cages in the pipe. R & L

(Continued on page 89)

The plain-pallet stripper can produce 200 blocks per hr.

The pipe-storage yard with plant in background.



Concrete-pipe machine which makes units up to 30 in. in diameter.

D. R. ("Spec") COLLINS Says:

Do a Little Cost Cutting Before You Consider "Price Cutting"

AS this is being written there are appearing in nearly 200 communities, a series of full-page newspaper advertisements that at once challenge and present an opportunity to the concrete-units industry. These advertisements are sponsored by the Producers' Council, but are being paid for by local building-material firms, craftsmen and financing agencies. Their theme is "More House for Your Money—To-day."

They are the answer of the construction industry to the demoralizing criticism that "building costs are too high"—a criticism engendered by a lack of proper knowledge of true construction costs—a criticism that has not considered true value. They place before the home-building public *facts* about home-building values in a manner that the public can understand. For, truly, value in homes is greater to-day than it was ten years ago without resorting to "cut prices" or endangering the wage of building labor.

This series of advertisements is bound to result in the construction of thousands of homes. And they can result in the sale of hundreds of thousands of concrete-masonry units, at a profit, by manufacturers who during the lean years have learned to substitute "cost-cutting" for "price-cutting". That is, the concrete-units manufacturer who has learned to make a better, and a greater variety of units, such as ashlar, at a price to fit to-day's market without the sacrifice of quality.

Thinking back over nearly 20 years' association with the concrete-units industry leads me to believe that the lack of a proper knowledge of costs has wrecked more concrete-units businesses than any other one cause. Some of these wrecks have been salvaged and started anew. But in many cases they have not only sunk completely, but have carried others with them. Because there is so much opportunity ahead for the concrete-units business — intelligently run, I want to talk a bit about this business of "cost-cutting" versus "price-cutting". If what I have to say helps but a dozen manufacturers to greater profit, this little story will have done its job satisfactorily.

For the past few years house builders have been looking for bargains. Sellers have been cutting or disregarding profit entirely to provide these bargains, to keep going. Special concessions and secret deals—invariably public property a few hours after they are made—have undermined confidence in many good concrete-units markets. In the place of confidence has come fluctuation and distrust.

The greatest root of this trouble has been the units manufacturer who is always ready to jump to conclusions. If a competitor can make a ridiculously-low price on a certain unit, then he can make the same price. He makes no analysis of costs. He jumps, and, if he does it too often, into financial insolvency.

There is only one remedy for this malady—*an accurate knowledge of costs and a selling price based on this knowledge*. With construction on the upgrade the application of such a remedy is absolutely essential, if the patient is to live and prosper. Just why more of it has not been done in the concrete-units business is beyond the ken of the writer. *After all, cut prices not based on cut costs are much like sunburn.* They cause a lot of pain, give us something to talk about, but are in nine cases out of ten preventable.

"Cut prices not based on cut costs are much like sunburn. They cause a lot of pain. . . ."

Giving the house builder more house for the money will be one of the major problems concrete-units manufacturers will have to face in 1939. But if the price of the product is based on true cost plus a fair profit, the industry is bound to prosper, because of the increasing popularity of its products. It is in the firmest position of its life to give this greater value the public is learning to demand. If, during the next three months, the products manufacturer gives his cost system as well as his plant and equipment a complete overhauling, he is bound to profit handsomely in the 1939 ascending market.

Let's face the issue squarely. The concrete-units industry is going to be asked to do its share in providing "more house for the money" in 1939. The smart manufacturer has learned his lesson of allegedly giving value by price-cutting. He has learned to know his costs. He has established them by facts. And he is not going to sell below this cost. He knows that even one slip may be the beginning of tragedy. His first below-cost order is usually taken either in the heat of meeting competition or "to keep the plant going". You know; "one little drink". Usually such a concession is a profound secret between seller and buyer. It remains so until the buyer meets a friend. The news is passed along. The below-cost price is soon public property. And the manufacturer is now forced to give it to his entire trade, with pressure being brought to bear on his competitors which compels them to do likewise. In the early 'twenties and 'thirties when sales forces were small, it took considerable time for concessions and price-cuts to travel. Now they seem to reach everywhere, like a radio broadcast, in a few minutes.

There is only one price system which can make money for the concrete-products industry and at the same time enable that industry to give "more house for the money". That system is based on production costs lowered through good plant equipment and management. It is a system based on the production costs of the *seller* and

Do you know why you get
25% TO 40% MORE HOME
for your money than ever before?
Today's Home Offers GREATER VALUE For Less Money ON 16 COUNTS!
WHO SAID TODAY'S HOUSE ISN'T A BARGAIN? LOOK!
THE HOUSE YOU BUILD OR BUY IN 1938—WITH 25% TO 40% MORE REAL VALUE—actually costs much less than the 1926 house
COMPARE
$8000 -1927
$6990 -1938
...AND YOU GET
MORE HOME
for your money TODAY, too!
$7200
$6650
...actually, in Today's Home you get 25% to 40% MORE REAL VALUE

Four specimens of the full-page newspaper advertisements being used co-operatively by builders and building-material men in 200 cities.

not on those of his competition. There has never been an outstanding manufacturing success in America which has not been based on this policy.

It is always interesting to watch the bargain-hunting pressure of buyers when a manufacturer starts to waver on price. And such wavering is more than likely to happen if the manufacturer is not certain of costs. There is nothing that will give intestinal fortitude to a manufacturer when he is baited with a temptation to take an order at a cut price more quickly than an accurate knowledge of his costs. And, conversely, there is nothing that will spread the red ink on his ledger faster than a lack of that knowledge. If he does not know his costs and is drawn into not one price-cut, but a series of price-cuts, he usually resorts to the dangerous expediency of quality-cutting. And that is the final step to complete disaster.

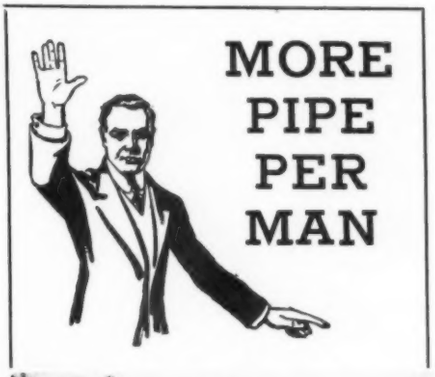
Many a units manufacturer will claim that if he, occasionally, does not cut selling price below production cost he will lose good-will—good-will he has spent years building with his trade. Certainly he will lose customers and good-will *temporarily*. But experience has shown, and is showing, that such good-will and customers as are lost can be regained by a constructive and aggressive selling program. Most building-material buyers are bargain hunters. At the same time they would rather have stable prices, if those prices are fair, than fluctuations. For, after all, the shrewdest buyers do business with a firm that not only sells a product, but gives a definite service with it.

So, to give "more house for the money" the concrete-units industry must make its beginning in its factories. New methods, new equipment, new operations which will make savings must be worked out. New products that will save money for the building industry must be worked out. New angles of sales and service must be found. The smart manufacturer is already at work putting his manufacturing and selling house in order. He is finding a way to make his product at a price that will give the public a greater value. And he is learning exactly what it is costing him. He is going to make a good product and sell it at a fair price. And he is going to do his share of giving America's house builders "more house for the money—to-day".

But he is not going to resort to price-cutting and financial suicide. His contribution will be made only when he knows the facts of cost-cutting.

Wyoming Bentonite Is Shipped to Valparaiso

A shipment of two tons of bentonite from the Greybull, Wyo., district has been sent to the Braden Copper Company at Valparaiso, Chile, where it is understood the bentonite will be used in foundry work. This makes the second order received recently, and operators of Greybull are hopeful that bentonite production will gain considerably in proportion during the coming year. A ton of the material was shipped recently to Sieben, Mont., for use in sealing leaky reservoirs.



Profits in concrete pipe making depend upon ***production***, both in quantity and quality. UNIVERSAL Concrete Pipe Machinery is the "all purpose" type, insuring the greatest economy and maximum pipe output per man.

Write for Bulletin

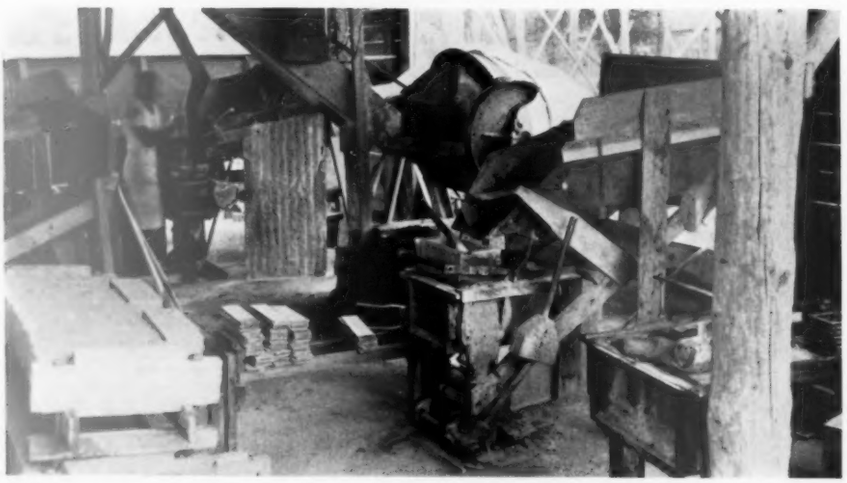
UNIVERSAL Concrete Pipe Co. Columbus, Ohio

PROFITABLE NEW PRODUCTS

CONCRETE UNITS FROM FLORIDA SANDS

Part of the storage yard with the block plant and high-car loading station in background.

Railroad cars are loaded direct from the classifiers at the sand plant. Pipe-line from the dredge may be seen at the right.



The concrete mixer and some of the machines in the Interlachen company's block plant.

EARLY in 1938 the Diamond Interlachen Sand Co., of Interlachen, Fla., one of the largest and oldest producers of aggregates in that state, built a plant for the production of concrete blocks. This is operated by a subsidiary, the Interlachen Concrete Tile Co.

Unlike most block plants this plant is not located near its major market, usually a large city, but is situated at the gravel plant near Interlachen, which is a town of about 225 inhabitants. The chief market for the blocks is in Jacksonville 60 mi. away, and there is no other city of over 25,000 population within 100 mi. of the plant. The nearest town of more than 1,000 people is Palatka with 6,500 population, 10 mi. from the plant, and the nearest city of over 10,000 population is Ste. Augustine with 12,100 inhabitants, 40 mi. distant. In spite of this seemingly distant and scattered market, the company has built up a steady demand for this product and the plant has operated at near capacity since it was built.

Sand for the block plant is loaded at the sand plant into a railroad car and then unloaded with hand shovels to ground-level bins. Gravel is taken from storage piles into a truck for discharge to these bins. From these bins the aggregates are shoveled into a 1-sack Jaeger tilting concrete mixer. The concrete is dumped on the concrete floor and is shoveled into wheelbarrows and from them into the hoppers of the four Maddox hand-tamp block machines. One of these machines is used for small sizes of block and the others for blocks up to 8-in. by 8-in. by 16-in. The 4-in. by 8-in. by 16-in. size has been the most popular and each machine can turn out 500 of these daily. The finished blocks are stacked on wooden racks and are hauled to outdoor storage on a Barrett-Cravens hydraulic jack with hard rubber tires. The blocks are sprayed for 10 days before they are shipped.

The sand-and-gravel deposit owned by the company has been worked for many years. In 1926 the Baker & Holmes Co. took over the Interlachen Sand & Gravel Co. and this deposit. In April, 1931 a consolidation was effected with the Diamond Sand Co. to form the present Diamond Interlachen Sand Co. The officers of this company are S. D. Gooch, president; John D. Baker, Sr., vice-president; Thompson Baker, secretary-treasurer and general manager. The plant's production is sold through the firm of Shands & Baker, Jacksonville, Fla., which also operates a sand plant at Lake Wales, Fla.

The deposit contains no shells and is in the form of sand hills ranging up to 30 ft. in height above water-level. The sand also extends to 20 ft. below water-level, where kaolin is encountered. The overburden consists of a few inches of friable black dirt which it is not necessary to remove. The sand is finest at the top and coarsest under the water, so a mixture is obtained by gunning down the bank from the dredge.

Dredging is done with an 8-in. Georgia pump driven by a 125-hp. G. E.

The revolving boxes which allow cars to be loaded to capacity without segregation.

motor. A plain intake nozzle is used with 8 under-water jets. Material is now being pumped about 1,000 ft. against a 45-ft. vertical lift. At the plant the material is discharged from the pipe-line into a box. A stationary screen with Tyler "Ty-Rod" wire cloth removes the trash and occasional large stones. The minus ¾-in. material is split to two Link-Belt 6-ft. cones. A revolving wooden box of original design at the bottom of each cone makes it possible to discharge the sand to either side of a car for better loading and the elimination of segregation. These boxes also mix the finer and coarser materials which slide down opposite sides of the cones and ordinarily have a tendency to go to opposite sides of the cars. The overflow from the cone is flumed to waste.

This plant has only enough clearance under the cones for regular gondola cars. When high hopper cars are specified by a customer, these are loaded under another plant. This consists essentially of an 8-ft. Link-Belt cone near the block plant. A valve and Vee in the dredge pipe-line feed this cone. Cars are "spotted" by gravity. An 800-ft. sidetrack connects the plant with the railway.

Freshly-made blocks are hauled to outdoor storage on this hydraulic jack.

Camp (from page 85)

hand molds are used to make 4-in. drain tile. A Syntron Model V-75 electric vibrator is used for pipes over 30-in. in size. The largest made by the company is 48-in., but some 60-in. pipes will be made. The pipes are carried into the curing rooms on carts with two pneumatic-tired wheels.

Another 12-cu. ft. Besser mixer is used to mix the concrete for the Besser block machine, which has made 200 standard 8-in. by 8-in. by 16-in. blocks

View in one of the four steam-curing rooms.

per hour. These blocks are transferred to steel racks, which are carried on rubber-tired lift trucks into the curing rooms.

There are four 20-ft. by 100-ft. steam-curing sheds at one side of the 60-ft. by 80-ft. main building. An old coal-fired boiler supplies the steam. The pipes and blocks are cured in these rooms for three days before they are removed to outdoor storage. The blocks are covered with tarpaulins and are wetted down for an additional period before they are shipped.

Most of the pipe is sold for municipal sewers and storm drains and some for Georgia and Alabama highway work. Blocks have been sold for the construction of houses, office buildings, dairy barns, etc. There is no other machine-made concrete block manufactured in this territory, but six clay-brick plants

Trailer-load of pipe ready for delivery.

located in or near Columbus furnish competition.

Shipments for local work are made in

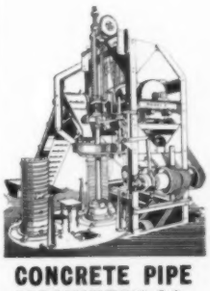
The modern office is a good advertisement for the Camp company's product.

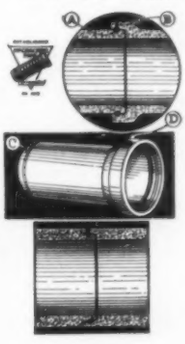
Ford trucks, three with dump bodies and one with a flat body. Distant shipments are made by a Mack truck with a 24-ft. trailer and by railway.

5 Reasons Why You Should Choose The Dual Packer Head Machine for Better Concrete Pipe Production

1. The Dual Packer Head offers the greatest economy in producing 4 to 36 inch pipe.
2. It enables you to operate on either full or partial production basis with smaller crews.
3. It eliminates pallets, allowing immediate stripping of molds.
4. It permits you to lease a portable unit to take care of those distant jobs at a profit.
5. Finally, it produces a superior pipe, highly resistant to abrasion and corrosion, and provided with New Sealtite Joint preventing leaks and excessive infiltration—a pipe Guaranteed to stand up.

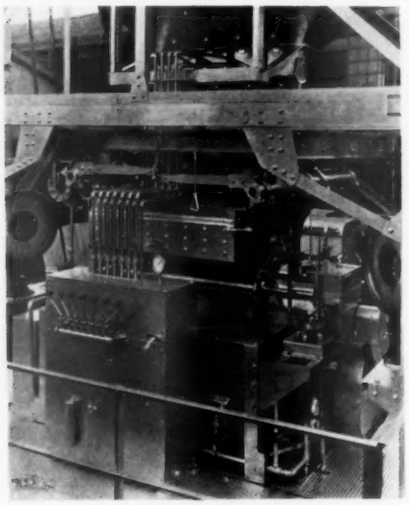
Write for details.





CONCRETE PIPE MACHINERY CO., SIOUX CITY, IOWA

LEFT—The asphalt plant completely assembled for operation. BELOW—View on the operator's platform.



Compact Bituminized-Aggregate Plant Is Quickly Assembled

A SEMI-PORTABLE plant for producing bituminized aggregates has been installed at Troy, O., by the Bowsman Washed Sand & Gravel Co. Built by Hetherington & Berner, Inc., at its factory in Indianapolis, Ind., it was shipped and erected by the builder in two days.

The plant is equipped with an S-30 twin-shaft pug-mill mixer capable of mixing from 3,000 to 4,500 lb. per batch, depending upon the aggregate used. It is equipped with two Kron springless dial scales,—one for weighing the aggregate and the other for weighing the bitumen. The hot-material bin has approximately 40 tons capacity and is built in halves with two compartments to each half.

The screen is of special design adapted to asphalt-plant use, manufactured by the Deister Machine Co. It has four full decks, 4 ft. by 6 ft., providing four sizes of aggregate in the bins and delivering any oversize into a steel reject chute. The screen is of the unbalanced-weight type and is so mounted on springs as to transmit the minimum vibration into the plant structure. It is fully inclosed and mounted on a frame to which the chutes are attached, making a complete self-contained unit.

The plant is designed in such a way that the mixer unit, containing the mixer, transmission parts, etc.; weighing unit, containing the scales, aggregate weigh box, asphalt bucket, steam-jacketed asphalt feed line; bin unit as described above; and the screen unit are each in themselves complete individual units.

The plant was erected by placing the mixer unit on steel legs, placing the weigh unit on the mixer unit, the bin unit on the weigh unit, and the screen unit on the bin unit. This unique method facilitates plant erection and makes it possible to leave the scales, steam-jacketed asphalt piping in the scale unit, and all service piping—that is, steam pipes to feed the valves, steam jackets and mixer gate—intact when the plant is moved. These units are so designed and constructed that they may be transported on a standard flat-bed truck and meet state road clearance specifications. None of them is more than 8 ft. wide nor of such length or weight as to be impossible to handle.

To add to the flexibility of the plant there is a self-contained mast and boom by which the plant may be erected. Thus no crane is necessary. The lifting is done by a small hoist mounted on one leg of the plant and run by the belt from the main drive shaft of the plant.

The drying unit furnished is a rotary, direct oil-fired horizontal shell, 30 ft. long and 60 in. in diameter. The drier is fed from a reciprocating feeder mounted under a 3-compartment, 40-ton bin. The bin and feeder are placed in a pit approximately 10 ft. deep and the bin is provided with steel runways so that trucks may pass over the top of it. A ramp approximately 6 ft. high runs up to the bin.

All aggregate is obtained from the Bowsman gravel plant near by and trucks are used to feed the cold-material bin, doing away with the necessity of a clam-shell crane to feed the drier.

Heat is provided for drying the ma-

terial in the drier by means of high-pressure natural gas. Two gas burners are provided if the material is extremely wet, although only one is ordinarily used.

An unusual feature of this plant is the hydraulic control equipment used on the mixing platform. There are seven small cylinders used for actuating the four bin gates, the weigh-box gate, the asphalt-bucket gate, and the valve from the asphalt line. In a small case approximately 4 ft. high, 5 ft. wide and 1 ft. thick are installed a small electric motor, a hydraulic pump, a storage tank, a filter, and valves which actuate the cylinders. This system works under approximately 250 lb. per sq. in. pressure.

The asphalt is circulated by means of a Viking steam-jacketed pump and can be drawn from any of three tanks and returned to any tank or run to the plant through steam-jacketed lines and fittings. The returned condensate of the coils in the tanks, steam-jacketed lines and steam jackets on the plant is trapped and automatically fed back into the boiler. The boiler is also equipped with a high-pressure gas burner and a fully automatic Kisco system is employed in this operation.

The mixing tower, that is, the mixer, screen and hot elevator, is driven from one power unit, an electric motor of approximately 60 hp.

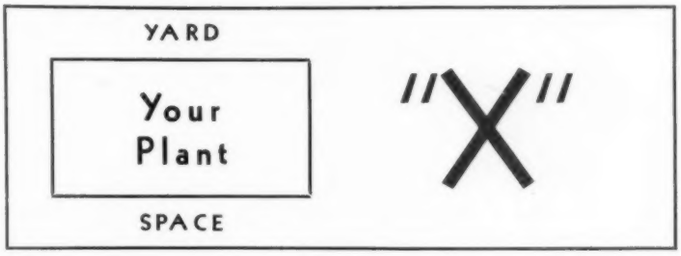
The drying unit, including the drier drum, cold elevator and feeder, is driven from another electric motor of approximately 50 hp.

Standards for Concrete Units Now Available

The Division of Simplified Practice of the National Bureau of Standards has announced that printed copies of the second revision of Simplified Practice Recommendation R32, Concrete Building Units, are now available. This recommendation lists sizes and tolerances for load and non-load bearing block and tile, and for face and common concrete brick and is effective from August 1, 1938. Copies may be obtained from the Superintendent of Documents, Government Printing Office, Washington, D. C., for 5c each.

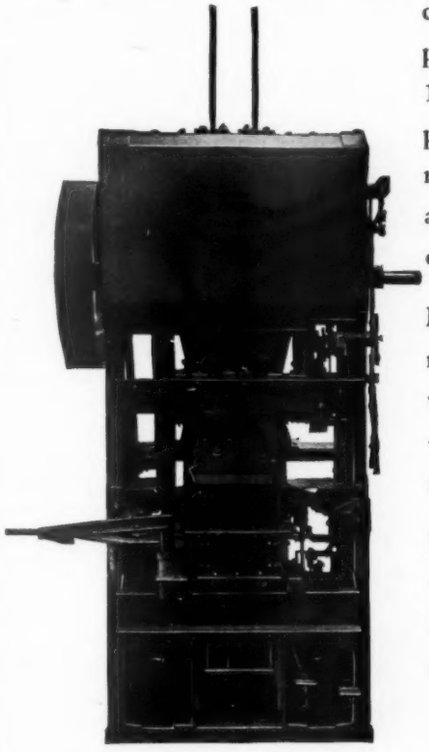
The original recommendation, which was approved by a general conference of producers, distributors, and users in 1924, reduced the number of sizes of concrete building units to thirteen, and established one size for concrete brick. In 1932 the industry accepted the Standing Committee's suggested revision which modified some dimensions and added four units to the recommended list. The present revision adds four 11¾-in. units to the schedule.

"X" MARKS THE SPOT!



WHERE "X"TRA PROFITS ARE MADE!

Put your waste space to work. Install a Multiplex machine and multiply your profits by manufacturing quality concrete blocks. Multiplex Super Tamper is a powerful and universal unit, handling any kind of material, and producing blocks from 4" to 12" at a rate of 5 to 6 blocks per minute. The Multiplex makes blocks of uniform size and distinctive texture, identically finished for easy laying.



Hand or power controlled models of every type and size, with capacities ranging from 400 to 800 blocks per day, assure profitable operation.

Investigate our new reverse screw paddle action Multi-Mixer, which gives greater speed and a more uniform mix.

Write for your copy.

The Multiplex CONCRETE MACHINERY COMPANY

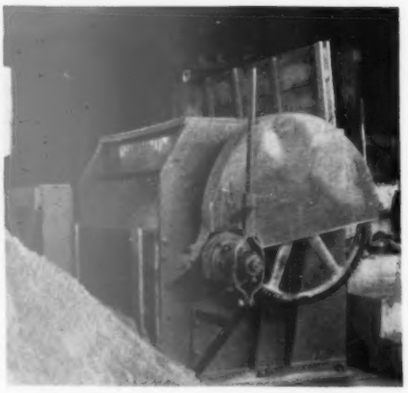
ELMORE, OHIO

Modern Production Facilities Bring About Increased Sales

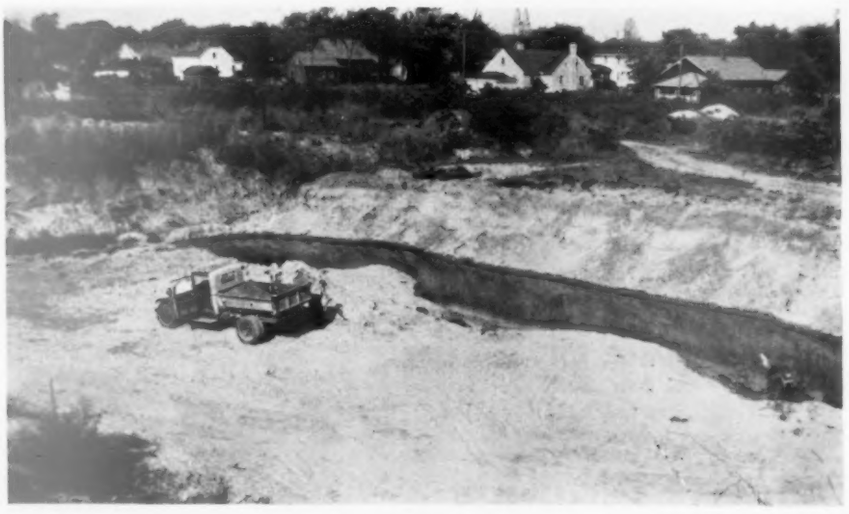
NOT so many years ago a concrete block was a concrete block. Users demanded little in the way of strength, uniformity or appearance. Most of the product was used below grade anyway, or for small, nondescript buildings, and the builder was easily satisfied. But in recent years the "backyard" producer has found it increasingly hard to dispose of his product, because concrete building units have come up out of the basement and are being used on a wide scale for both loadbearing and non-loadbearing walls, for partitions, as back-up for many varieties of facing materials. Architects and builders are insisting that only quality concrete units will be acceptable for the job, and the block manufacturer, if he hopes to continue in business, turns to modern production methods.

Such a situation recently faced Milcarek Bros. at Michigan City, Ind. Vincent Milcarek and his sons, Joseph and Vincent, Jr., have been identified with the manufacture of concrete blocks and engaged in concrete contracting in Michigan City for 35 years. The elder Milcarek passed away in 1931 and the sons have since carried on the business. Throughout the years thousands of blocks were produced on hand-operated machines. For some years, however, the demand for units of this type began falling off, while enterprising manufacturers of quality products from outside began shipping into Michigan City.

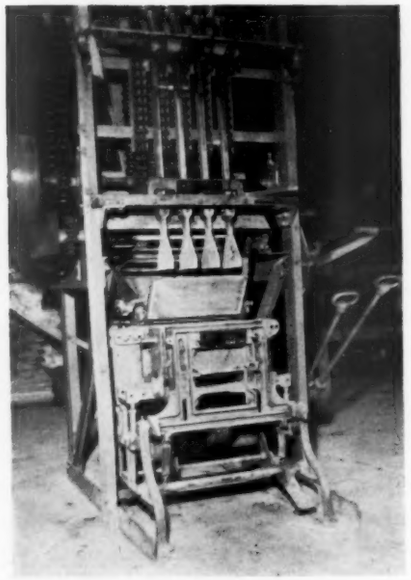
So a few months ago the Milcareks decided to place their plant on a modern and quality production basis. A new No. 4 power tamper built by the Miles Mfg. Co. was installed, together with a new Blystone shovel-type mixer. A small pit adjoins the plant and this supplies much of the aggregate used. An Insley drag-line excavates the material from a pond in the pit and a Ford dump-truck carries it to the mixing floor of the plant, where the oversize gravel is removed by a stationary inclined screen. The new power tamper is located on the bottom floor below ground-level, immediately under the mixer. Cement is purchased in paper bags by the carload, the plant being located on the main line of the Pere Marquette Railroad.



The new shovel-type mixer.



Small pit which adjoins the concrete-block plant and supplies the aggregate requirements.

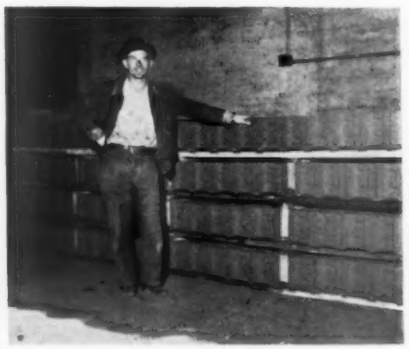


Power tamper recently installed.

With the new equipment an exceptionally fine product is being turned out, the entire output being absorbed by the building industry in Michigan City. More than 1,100 standard 8-in. by 8-in. by 16-in. units are being produced in an 8-hr. day.

At present the units as they come from the machine are wetted down and allowed to cure 3 or 4 days inside the plant, after which they are trucked to outdoor storage. Moist-curing facilities are to be installed later on, however.

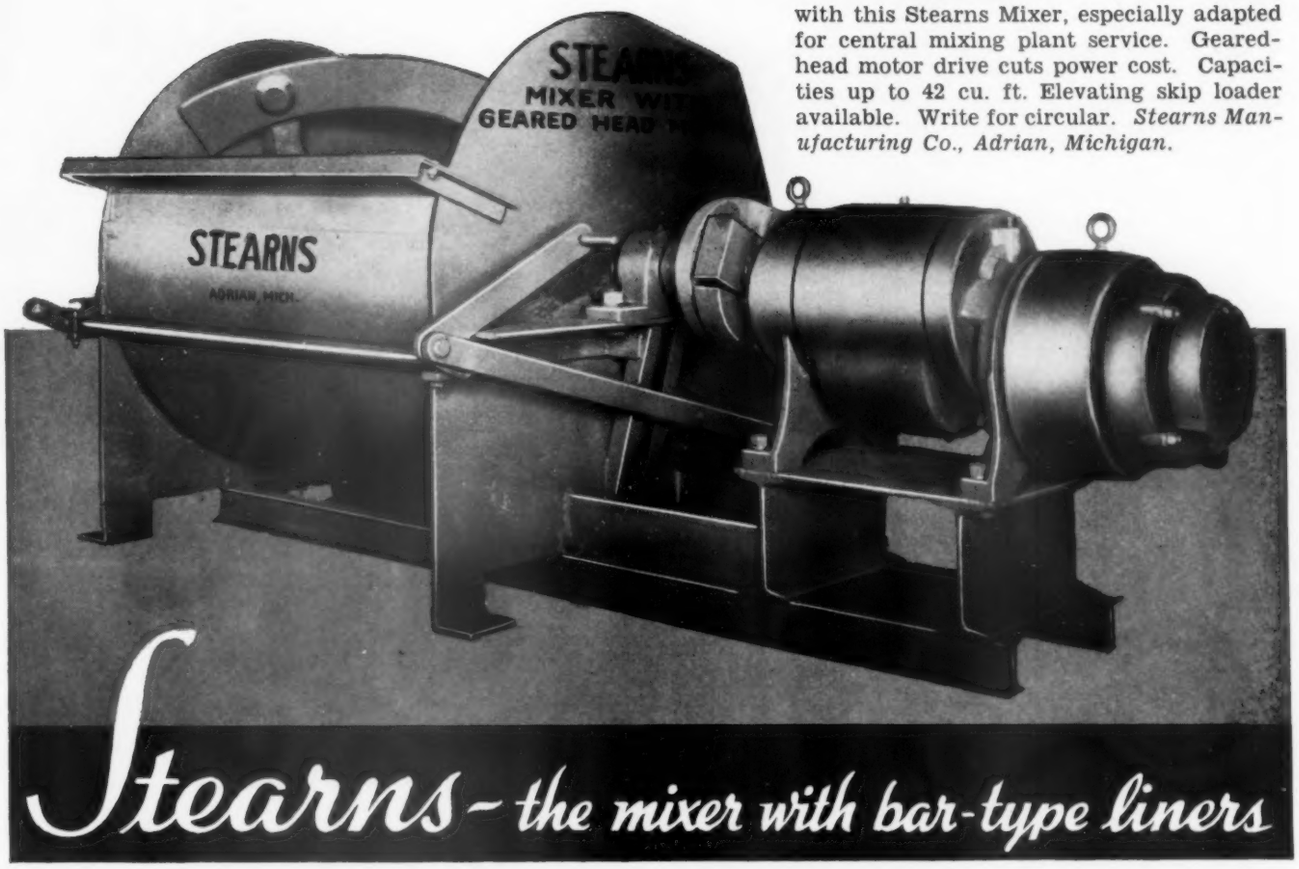
While the Milcareks have recaptured their concrete-block market, they continue to keep busy in the concrete contracting field. Block after block of sidewalks in Michigan City bear the Milcareks' die-mark and this fall they have concreted several filling-station areas. Early in October they were assisting in the construction of a huge outdoor swimming pool on a private estate nestled in the picturesque dunelands which sweep the Lake Michigan shoreline in Indiana and western Michigan.



Joseph Milcarek poses before a part of a day's production of blocks.

Turn Aggregates into Profits

with this Stearns Mixer, especially adapted for central mixing plant service. Geared-head motor drive cuts power cost. Capacities up to 42 cu. ft. Elevating skip loader available. Write for circular. *Stearns Manufacturing Co., Adrian, Michigan.*



Stearns – the mixer with bar-type liners

Still Going Up!

The number of executives subscribing to PIT AND QUARRY rises steadily.

Every month occasional readers decide to make the reading of PIT AND QUARRY a regular habit and so the list of paid subscribers grows. Why not make the same decision for yourself today and have the copies addressed to you personally? As an added means of preventing delay in receiving their copies many executives have PIT AND QUARRY sent to their homes, where it can be read at leisure and in comfort.

PIT AND QUARRY is subscribed to by more than 2,200 administrative and production executives—presidents, vice-presidents, general managers, superintendents, engineers, chemists, production managers, etc. For years it has had more producer subscribers than any other paper reaching the nonmetallic-minerals field.

Whatever your company's products may be, whatever your personal responsibility may be, whatever industrial problems may interest you most, PIT AND QUARRY should be your choice for news, for descriptions of new plants, processes and equipment, and for practical discussions of the matters that vitally affect your business.

The price is still $1 for one year.

PIT AND QUARRY PUBLICATIONS
538 South Clark Street, Chicago, Ill.
Publishers of *Pit and Quarry Handbook* and *Pit and Quarry Directory*

BARRETT LIFT-TRUCKS
ONE MAN HANDLES 48 BLOCKS
NO BREAKAGE

Available for fifteen days free trial without obligating you to buy.

Handle your green concrete products the way that more than 800 other concrete products plants do, WITH BARRETT LIFT-TRUCKS EQUIPPED WITH A SUPER-SPRING FRAME AND RUBBER TIRES. Eliminate breakage—joggling out of shape and spoilage. Save time, money and labor by eliminating all unnecessary handling and breakage. Take your blocks direct from the machine to the curing room—with ease and dispatch. One man handles 48 blocks of the 8x8x16 size—or, 32 blocks of the 8x12x16 size. Write for illustrated circular.

BARRETT-CRAVENS COMPANY
3251 West 30th Street CHICAGO, ILL.
Representatives in all principal cities

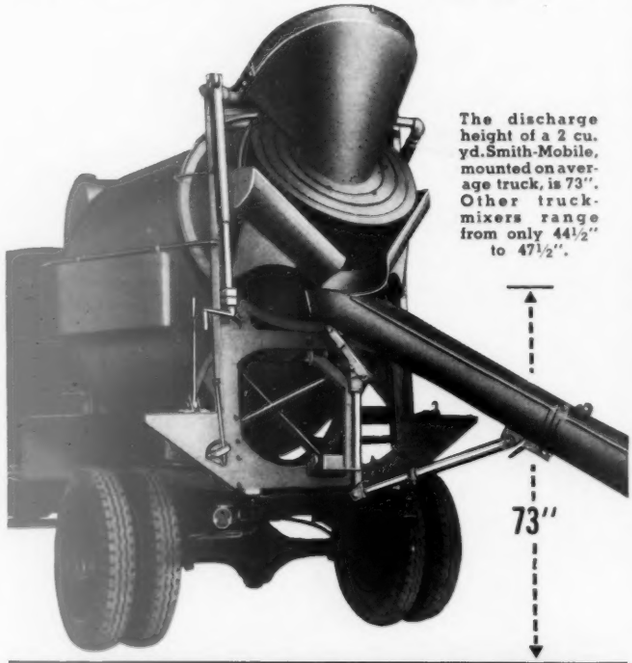
$ave with $mith-Mobile

When you operate a new Smith-Mobile, instead of an old style truck-mixer, it's like adding $500 to your bank account. For Smith-Mobile's high discharge eliminates the necessity for a rear end hoist. You not only save about $500 in the initial investment, you also avoid hoist maintenance and operating costs. In addition, you materially cut down the dead load of your truck-mixer.

Smith-Mobile high discharge allows a much steeper angle for the distributing spout. Covers a greater area even with dry concrete. Permits you to discharge directly into high forms. Not even a ramp is required.

There are many other exclusive Smith-Mobile features: Feed Chute Charging, Visible Mixing, etc. Before you buy your next truck-mixer, be sure to investigate Smith-Mobile.

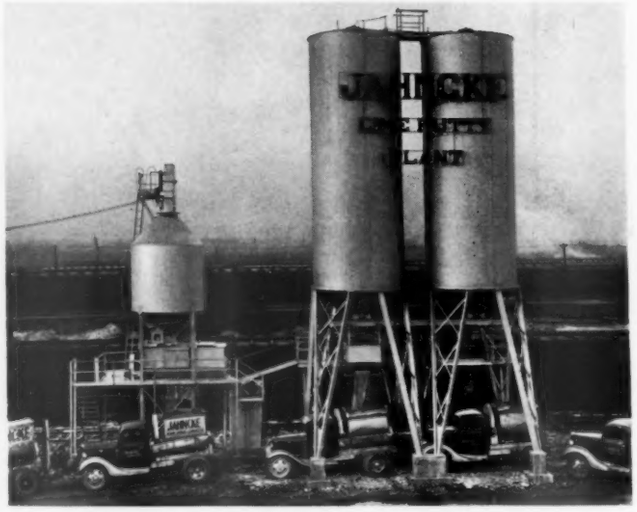
The T. L. SMITH COMPANY
2887 North 32nd St. • Milwaukee, Wis.



The discharge height of a 2 cu. yd. Smith-Mobile, mounted on average truck, is 73". Other truck-mixers range from only 44½" to 47½".

SMITH-MOBILE
THE *Modern* TRUCK MIXER and AGITATOR

A 2383-½



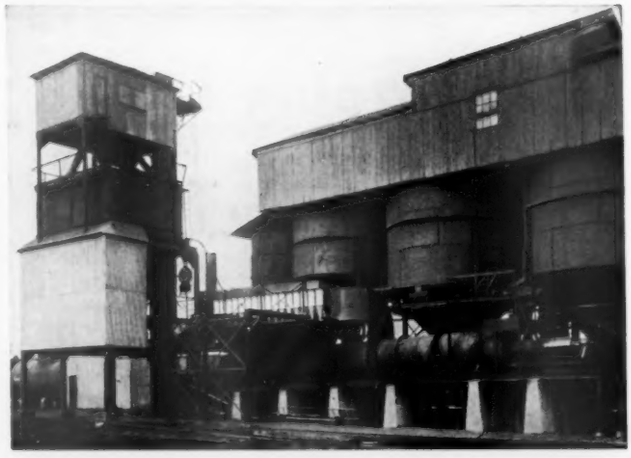
Add Lime Mortar to Your Line

Jahncke Service, Inc., 68-year-old New Orleans firm, produces aged lime putty in the Brooks-Taylor plant shown above and distributes lime mortar to its customers in three parishes. If you want to expand your business, write for information on the Brooks-Taylor process.

CHICAGO BRIDGE & IRON COMPANY

Chicago	2451 Old Colony Bldg.	Tulsa	1648 Hunt Bldg.
New York	3389—165 Broadway Bldg.	Birmingham	1503 North Fiftieth St.
Cleveland	2264 Rockefeller Bldg.	Dallas	1486 Liberty Bank Bldg.
Philadelphia	1645—1700 Walnut St.	Detroit	1552 Lafayette Bldg.
Boston	1550 Consolidated Gas Bldg.	San Francisco	1092 Rialto Bldg.
Houston	2919 Main Street	Los Angeles	1457 Wm. Fox Bldg.

Plants at BIRMINGHAM, CHICAGO & GREENVILLE, PA.



WARREN ASPHALT PLANTS
HOT MIX —— COLD MIX
— OR —
COMBINATION UNIT FOR BOTH TYPES
CAPACITY DESIGN AND ARRANGEMENT TO MEET ANY REQUIREMENTS

Designed and Built
— By —
WARREN BROTHERS ROADS CO.
P. O. BOX 1869
Boston Massachusetts

PROVEN EARNING POWER

When DUNBRIK Manufacturers show sales of three million brick per year with production costs as low as $5.00 per thousand—others with selling price of 100% over cost—proves the great earning power of this line-production brick machine.

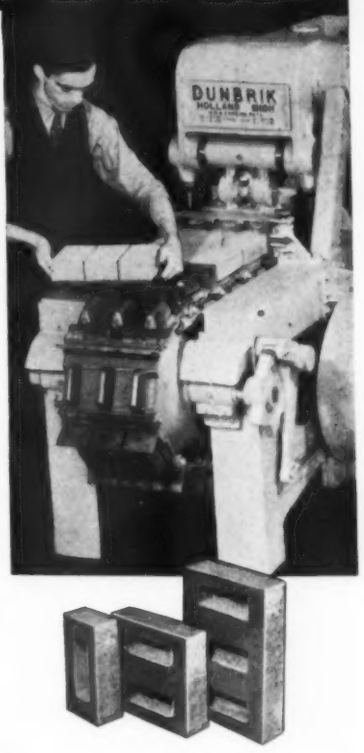
These enviable records are the result of producing a superior product,—lighter weight, greater strength, lower absorption, absolute accuracy, and with true corners. In addition, multiple sizes of standard brick (DUNSTONE) can be produced that permit hollow, insulated wall construction at cost level of frame.

Write today for new book "4 Keys to Success" and learn about this wonderful machine, permitting large production with only one or two men and costing but a fraction of what would be required for other processes of equal capacity.

DUNTEX ROOF TILE MACHINE

With this machine you can dominate the vast roofing material market with a product unequalled in value, permanence, beauty and fire-safety. Your manufacturing costs are low, investment moderate, and selling prices offer attractive profit.

Send today for "DUNTEX Survey"



W. E. DUNN MFG. CO.
420 W. 24th St. Holland, Michigan

EASY TO MAKE EASY TO SELL *Concrete Joists*

R & L "Crescent" Ten-Gang Joist Mold

For you aggregate men who are looking for a profitable side line with a ready market . . . there is a big opportunity at small investment in the R & L Concrete Joist Machine. The building industry is "sold on" concrete joists . . . it's just a matter of taking orders for a proved product.

R & L *Write for Bulletin and full details*

CONCRETE MACHINERY CO.
KENDALLVILLE, IND.

We also manufacture Pipe Molds and Machines, Tile Forms and Vibrating Tables

McCARTER ASPHALT MIXING PLANTS

Let McCarter modernize your present plant by installing the latest and most efficient type of equipment—developed from more than a century of experience. All units are fabricated in our own shops and specially designed to meet your needs.

Latest features include:

McCarter Pug Mill Mixers, steam or electrically heated; capacities: one, one and one-half and two tons.

A. C. Weigh Buckets, non-leaking, non-tilting, steam or electrically heated.

Patented Telescopic Driers for hot or cold mixes.

Send for Bulletin

Designers and Manufacturers without Interruption Since 1827

The McCarter Iron Works, Inc.
NORRISTOWN PENNSYLVANIA

They're Buying Jaegers because

JAEGER ALONE Builds This MODERN TRUCK MIXER....

1. SYPHO-METER WATER TANK

Accurate within a fractional per cent of tank capacity **regardless of tank position or splashing on roughest roads** — a 1939 improvement.

2. DUAL REVOLVING WATER SPRAYS

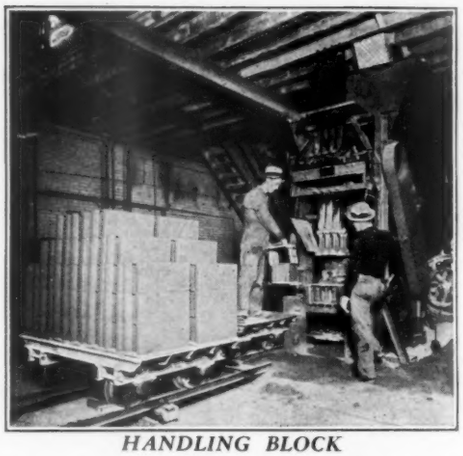
100% faster, uniform water distribution — clear path as they revolve, spray **into and over mass in both directions, from end to end of drum** — insure thoro mix even on shortest hauls — a 1939 improvement.

3. MORE SALABLE CONCRETE

Jaeger Reversing End-to-End Mix, plus accurate measurement and more rapid and uniform distribution of water, produce recognized higher strength concrete, give Jaeger operators a basic sales advantage. Bulletin TM-39 gives up-to-the-minute information. Send for your copy.

THE JAEGER MACHINE COMPANY
602 Dublin Ave. Columbus, Ohio

BLOCK PRESS



HANDLING BLOCK

Having perfected their new press for handling the larger units with tongs at a saving in the installation and operating, increasing capacity and efficiency 40%, as shown in cut, *handling cement and lime mixes* with high pressure steam curing, prevents shrinking, wall cracking, stronger and denser in texture, lighter in weight, and color. Product can be delivered 24 hours after receipt of raw material. Has been used 37 years in North America.
This new method of making Sand-Lime Blocks handling with tongs is being used by other manufacturers and helping the industry in making a better and cheaper product to encourage their use.

For further information write

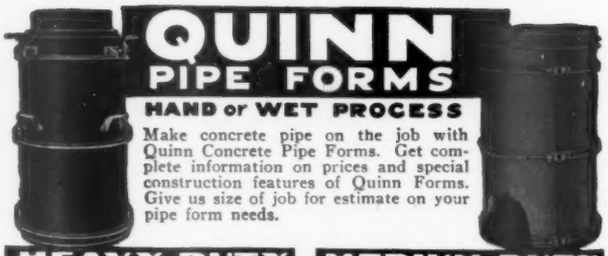
JACKSON & CHURCH CO.
Founded in 1881 - Incorporated in 1898
Founders, Machinists, Steel Fabricators
The Saginaw System Sand-Lime Brick and Beet Sugar Machinery
BERTOSSA SYSTEM OF AIR CONDITIONING
Saginaw, Michigan, U. S. A.

BLAW-KNOX TRUKMIXERS AND AGITATORS

The popular choice of contractors, engineers and users because they are built for a lifetime of dependable, economical service. They mix concrete faster and more thoroughly and produce high strength concrete of maximum workability. Completely described in the New Blaw-Knox Catalog No. 1582. Send for your copy today.

BLAW-KNOX DIVISION of Blaw-Knox Co.
FARMERS BANK BUILDING · PITTSBURGH, PA.

QUINN PIPE FORMS



HAND or WET PROCESS

Make concrete pipe on the job with Quinn Concrete Pipe Forms. Get complete information on prices and special construction features of Quinn Forms. Give us size of job for estimate on your pipe form needs.

HEAVY DUTY

Built for more years of service—sizes for any diameter pipe from 12 to 84 inches — any length — tongue and groove or bell end.

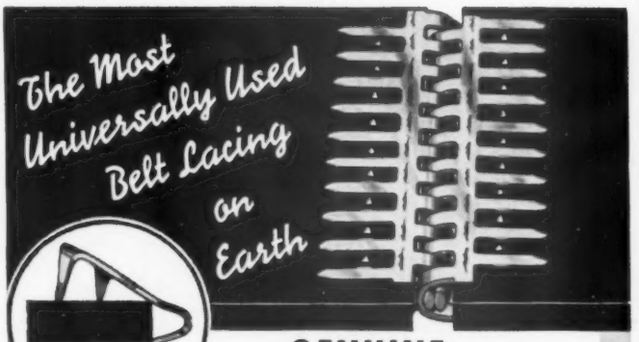
MEDIUM DUTY

Makes same sizes pipe as "Heavy Duty" but built to meet demand for lower cost equipment to produce uniform quality in smaller amounts.

Also manufacturers of concrete pipe machines for making pipe by machine process.

QUINN WIRE & IRON WORKS 1627 12 St. Boone, Iowa

The Most Universally Used Belt Lacing on Earth



GENUINE

ALLIGATOR

TRADE MARK REG. U.S. PAT. OFFICE

STEEL BELT LACING

Ease of application, "Never Lets Go," the sectional rocker hinge pin, smoothness on both sides, flexibility and separability make genuine Alligator the most universally used Steel Belt Lacing. Clinched teeth prevent ply separation in belt ends. Twelve sizes for flat belts of all types up to 5/8 in. thick. Standard Boxes, Handy Packages and special long lengths. Also made in Monel and alloys. Sold throughout the world.

Sole Manufacturers

FLEXIBLE STEEL LACING COMPANY

4623 Lexington St., Chicago

In England at 15 Westmoreland Place, London, N.1.

Effective Screening WITH LINK-BELT *Vibrating* SCREEN

● The Link-Belt Vibrating Screen has proved its effectiveness in the screening of all sorts of materials, such as sand, gravel, crushed stone, coal, coke, clay, fertilizer, lime, ore, grain, sugar, chemicals, pulpwood chips, etc. Its uniform vibration keeps the meshes open, makes the screen's entire screening surface 100% effective. Send for Catalog No. 1562.

LINK-BELT COMPANY

Philadelphia, Chicago, Indianapolis, Atlanta, San Francisco, or any of our offices located in principal cities.

7144-B

RIGID SPECIFICATIONS DEMAND THE BEST EQUIPMENT . . . *use*

YOU don't have to be an experienced producer to know that in the long run the ***best*** *equipment is the* ***cheapest.***

EAGLE SAND AND GRAVEL WASHERS

You are assured of efficient, dependable and economical operation when using Eagle Sand and Gravel Washers, single or twin screw. Gives you greater capacity which speeds up production. More scrubbing action produces cleaner sand and gravel to meet rigid specifications which means greater profits. Eagle Washers operate smoother and are sturdily constructed for years of service. Write for Bulletin covering Eagle Washers.

This is the Single Screw Eagle Washer. The Twin Screw Washer is recommended for those with exceptionally large capacity requirements.

We also manufacture the famous Eagle "Swintek" Screen Nozzle Ladder and can offer pertinent suggestions in connection with your dredging operations.

EAGLE IRON WORKS

129 HOLCOMB AVENUE — DES MOINES, IOWA

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 112

Aggregate-Bituminizing Plants
Hetherington & Berner, Inc.
McCarter Iron Works, Inc., The
*Warren Brothers Roads Co.

Agitators, Thickeners and Slurry Mixers
*Traylor Engr. & Mfg. Co.

Air Compressors (Portable)
*Chicago Pneumatic Tool Co.

Air Compressors (Stationary)
*Chicago Pneumatic Tool Co.
Fuller Company

Air Conditioning
Jackson & Church Co.

Air Filters
*Blaw-Knox Co.
*Dracco Corp.
*Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Air Separators
Babcock & Wilcox Co.
*Gruendler Crusher & Pulverizer Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sly Mfg. Co., W. W.
Sturtevant Mill Co.
*Williams Patent Crusher & Pulverizer Co.

Alloys (Steel)
Chicago Steel Fdry. Co.
Frog, Switch & Mfg. Co.
Manganese Steel Forge Co.
Stulz-Sickles Co.

Ash and Refuse Handling Equipment
Allen-Sherman-Hoff Co.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Asphalt Mixing Plants
Hetherington & Berner, Inc.
McCarter Iron Works, Inc., The
*Warren Brothers Roads Co.

Automatic Feeders
*Fuller Company
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Schaffer Poidometer Co.

Automatic Weighers
*Blaw-Knox Co.
*Fuller Company
*Jaeger Machine Co.
*Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

Backfillers
*Austin-Western Road Machy. Co.
*Bucyrus-Erie Co.
Continental Roll & Steel Fdry. Co.
Northwest Engineering Co.

Balls (Grinding)
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
*Traylor Engr. & Mfg. Co.

Balls (Tube-Mill, etc.)
*Allis-Chalmers Mfg. Co.
Carnegie-Illino's Steel Corp.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Manganese Steel Forge Co.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Bar Mills
Jackson & Church Co.

Barges (Steel)
*Chicago Bridge & Iron Co.

Bearings (Anti-Friction)
Hetherington & Berner, Inc.
*Link-Belt Co.
Robins Conveying Belt Co.
*Sprout, Waldron & Co.
Timken Roller Bearing Co.

Bearings (Roller)
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacings
Flexible Steel Lacing Co.

Belting
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Belting (Multiple V)
Gates Rubber Co.

Bin Gates
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Bins (Cast Iron)
Allen-Sherman-Hoff Co.

Bins (Steel)
*Austin-Western Road Machy. Co.
*Blaw-Knox Co.
*Chicago Bridge & Iron Co.
Hetherington & Berner, Inc.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.
*Universal Crusher Co.

Bit Grinders
*Chicago Pneumatic Tool Co.

Blast-Hole Drills (See Drills—Blast-Hole)

Blasting Machines
Atlas Powder Co.

Blasting Supplies
Atlas Powder Co.
*Ensign-Bickford Co.

Block Machines (Concrete)
Dunn Mfg. Co., W. E.
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Block Machines (Power Press, Concrete)
Dunn Mfg. Co., W. E.
Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Blocks (Sheave)
*Haiss Mfg. Co., Geo.
*Sauerman Bros., Inc.
*Sprout, Waldron & Co.

Blowers
*Sly Mfg. Co., W. W.

Bodies (Motor Truck, Concrete Mixing)
*Blaw-Knox Co.
Jaeger Machine Co.
Smith Co., T. L.

Boilers
Babcock & Wilcox Co.

Borings (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Brick Machines (Concrete)
Dunn Mfg. Co., W. E.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Brick Manufacturing Equipment
Dunn Mfg. Co., W. E.
Jackson & Church Co.
Stearns Mfg. Co.

Bronze Work (Ornamental)
National Wire Cloth Co.
*Tyler Co., W. S.

Bucket Elevators (See Conveyors and Elevators)

Buckets (Asphalt)
McCarter Iron Works, Inc., The

Buckets (Clamshell, Orange-Peel, Etc.)
*Blaw-Knox Co.
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
Owen Bucket Co.
Wellman Engineering Co.

Buckets (Dragline—Cableway)
*Bucyrus-Erie Co.
*Link-Belt Co.
*Sauerman Bros., Inc.
Wellman Engineering Co.

Buckets (Dump)
*Brooks Equip. & Mfg. Co.
*Dempster Bros. Inc.
*Jaeger Machine Co.

Buckets (Elevator and Conveyor)
Chicago Steel Fdry. Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Buggies (Dump)
*LeTourneau, Inc., R. G.

Bulk-Cement Storage Plants
*Chicago Bridge & Iron Co.
*Sprout, Waldron & Co.

Bulldozers
*LeTourneau, Inc., R. G.

Burners (Oil)
Babcock & Wilcox Co.

Cableways
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Leschen & Sons Rope Co., A.
*Link-Belt Co.
*Roebling's Sons Co., John A.
*Sauerman Bros., Inc.

Caps (Blasting)
Atlas Powder Co.

Caps (Blasting, Electric)
Atlas Powder Co.

Capstans (See Winches and Capstans)

Car Dumpers
*Link-Belt Co.
Wellman Engineering Co.

Car Pullers
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Car Wheels — (See Wheels — Car)

Carriers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Carryalls
*Austin-Western Road Machy. Co.
*LeTourneau, Inc., R. G.

Cars (Block, Concrete)
Multiplex Concrete Machinery Co.

Cars (Brick Hardening Metal)
Jackson & Church Co.

Cars (Quarry and Gravel Pit)
*Austin-Western Road Machy. Co.

Castings
Babcock & Wilcox Co.
*Birdsboro Steel Fdry. & Machine Co.
Chicago Steel Fdry. Co.
*Eagle Iron Works
Frog, Switch & Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
McLanahan & Stone Corp.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Castings (Gray Iron)
Jackson & Church Co.

Cement Minerals Separation
Separation Process Co.

Cement Pumps (See Pumps; Air Pumps; Pumps, Cement Slurry; Pumps, Bulk Cement)

Central Concrete Mixing Plants (Comp.)
*Jaeger Machine Co.
*Sprout, Waldron & Co.

Chain (Dredge and Shovel)
Manganese Steel Forge Co.

Chain Drives
*Link-Belt Co.

Chain (Elevating and Conveying)
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Chutes and Chute Liners
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.

Classifiers
*Deister Machine Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Simplicity Engr. Co.
Sturtevant Mill Co.

Clips (Wire Rope)
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.

Clutches
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Coal-Pulverizing Equipment
*Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Compressors (See Air Compressors)

Concentrators (Slurry)
*Deister Concentrator Co.

Concrete Breakers (Air)
*Chicago Pneumatic Tool Co.

Concrete Mixers
*Blaw-Knox Co.
*Jaeger Machine Co.
Smith Co., T. L.

Concrete Products Plant Equipment
Universal Concrete Pipe Co.

Condensers
*Chicago Pneumatic Tool Co.

Cones (Sand-Washing)
*Chicago Bridge & Iron Co.
*Link-Belt Co.
Smith Engr. Works

Conveyor Belting
*Haiss Mfg. Co., Geo.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Conveyor Idlers and Rolls
*Haiss Mfg. Co., Geo.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Conveyors and Elevators
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Chicago Steel Fdry. Co.
*Dracco Corp.
*Fuller Company
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.

*See also information in the 1938 Pit and Quarry HANDBOOK.

Our Type H Jaw Crusher is the lightest, strongest and most efficient Blake type crusher ever built. See our Bulletin 1105.

Users never say "more of the same" unless they are satisfied!

TRAYLOR
TY REDUCTION CRUSHER

has been sold in twenty-three states, two territories and seven foreign countries, at the rate of nearly two per week since introduction, and every ninth machine went to a purchaser already operating one or more TY Crushers.

Success never happens—for the reasons of the success of the Traylor Type TY Reduction Crusher send for our new Bulletin 2112. You'll find it very interesting and instructive.

TRAYLOR ENGINEERING & MANUFACTURING CO.
ALLENTOWN, PENNSYLVANIA, U.S.A.

NEW YORK CITY 3916 Empire State Bldg.
CHICAGO 815 One La Salle St. Bldg.
SALT LAKE CITY 101 West Second South St.
LOS ANGELES 919 Chester Williams Bldg.
SEATTLE 6311 22nd Ave., N. E.
THE CANADIAN FAIRBANKS-MORSE CO., LTD. 980 St. Antoine St., Montreal, P. Q. Canada
B. C. EQUIPMENT CO., LTD. Vancouver, B. C. Canada
MAQUINARIA INTERNACIONAL, S. R. L. Av. Francisco I. Madero No. 17 Desp. 214, Mexico, D. F., Mexico
MANILA MACH. & SUPPLY CO., INC. Manila and Baguio, P. I.

Export Department—104 Pearl St., New York City.

Foreign Sales Agencies: London, Lima, Sao Paulo, Rio de Janeiro, Buenos Aires, Santiago, Valparaiso, Antofagasta, Iquique, Oruro

One SLY UNIT FILTER CONTROLS DUST from
ROCK CRUSHER and BELT CONVEYOR JUNCTION

★ The data for this series of advertisements describing actual dust control installations in crushed stone plants is taken from our files. The advertisements are presented to help you conform to insurance regulations, state and local laws, and to improve working conditions. They explain how one Sly Unit Filter effectively and economically controls several sources of dust at one time.

INSTALLATION NO. 1

You may have a dust problem which originates from a rock crusher (any type) and a belt conveyor junction. Depending on local conditions the solution is simple and inexpensive by using ONE Sly Unit Filter.

A suitably designed hood is necessary at the crusher and belt conveyor junction. A crusher hood usually requires an 8″ dia. exhaust pipe connection. Because the dust created at the junction is easier to control, a smaller 4″ dia. exhaust connection is generally adequate. A dual pipe or a large main pipe is used in joining these connections to the Unit Filter Case.

Piping and fan power expense can be cut to a minimum by installing the filter within 25 feet of the connections. In this case a 3 H.P. motor will efficiently drive the fan.

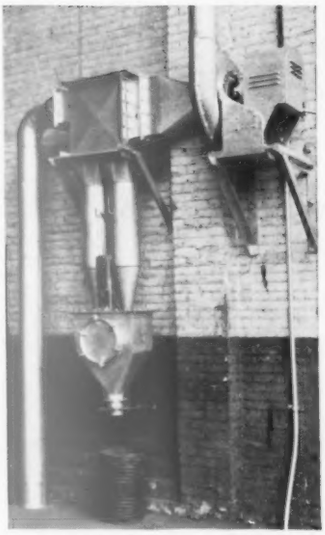
For the solution to your particular problem, consult an experienced Sly engineer. He will make correct recommendations.

For complete and immediate details, write for Bulletin P-93.

THE W. W. SLY MANUFACTURING COMPANY
4700-4750 Train Avenue Cleveland, Ohio
BRANCH OFFICES IN PRINCIPAL CITIES

BLAST CLEANING EQUIPMENT **SLY** TUMBLING MILLS
DUST CONTROL EQUIPMENT FOR EVERY INDUSTRIAL PURPOSE

No Dust Condition is too Small



This low cost, compact Multiclone installation is collecting abrasive dust from grinding wheels in a car shop. Larger installations, in any desired capacity, are collecting powdered milk and other food products. It doesn't matter what your dust or powder collection problem may be, Multiclones will solve it at high efficiency and low cost of operation.

Equipment offered by Western Precipitation Corporation covers every phase of dust, fog and fume collection, gas cleaning and recovery of values. Capacities from a few hundred c.f.m. to millions—hot or cold, wet or dry—to efficiencies up to 99.99 plus of *total solids* entering the collector.

Send for Bulletins

WESTERN PRECIPITATION CORPORATION

1016 West 9th St., Los Angeles, California • New York, N. Y.
Precipitation Co. of Canada, Ltd., Dominion Sq. Bldg., Montreal

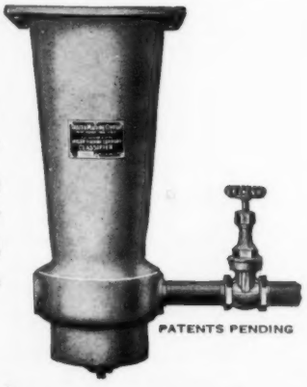
COTTRELL PRECIPITATORS . . . MULTICLONES . . . SPRAY DRYERS

PIONEER IN DUST AND FUME CONTROL

COMPOUND FUNNEL CLASSIFIER

For sizing minus 5/16" gravel and sand, and for cleaning it by washing out silt and other light impurities.

Descriptive Bulletin No. 23



PLAT-O

Improved Heavy Duty

VIBRATING SCREEN

Built in all standard sizes—in from one to three decks.

Write for Descriptive Bulletin No. 26

DEISTER MACHINE COMPANY

1933 EAST WAYNE STREET FT. WAYNE, IND.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 112

***Jeffrey Mfg. Co.**
***Kennedy-Van Saun Mfg. and Eng. Co.**
Lewistown Foundry & Machine Co.
***Link-Belt Co.**
McLanahan & Stone Corp.
New Holland Machine Co.
***Robins Conveying Belt Co.**
Smith Engr. Works
***Sprout, Waldron & Co.**
Sturtevant Mill Co.
***Universal Crusher Co.**

Conveyors (Pneumatic)
***Dracco Corp.**
***Fuller Company**

Conveyors (Ready-Mixed Concrete)
***Blaw-Knox Co.**
***Haiss Mfg. Co., Geo.**
***Jaeger Machine Co.**
***Jeffrey Mfg. Co.**
***Link-Belt Co.**
***Robins Conveying Belt Co.**

Coolers (Clinker)
***Fuller Co.**
***Smidth & Co., F. L.**
***Traylor Engr. & Mfg. Co.**

Coolers (See Kilns and Coolers—Rotary)

Correcting Basins
***Smidth & Co., F. L.**

Couplings (Flexible and Shaft)
Erie Pump & Engine Works
***Jeffrey Mfg. Co.**
***Link-Belt Co.**
***Robins Conveying Belt Co.**
***Sprout, Waldron & Co.**

Couplings (Hose)
***Chicago Pneumatic Tool Co.**

Cranes (Crawler and Locomotive)
***Austin-Western Road Machy. Co.**
***Bay City Shovels, Inc.**
***Bucyrus-Erie Co.**
***Link-Belt Co.**
Northwest Engineering Co.

Crusher Parts
***American Pulverizer Co.**
***Birdsboro Steel Fdry. & Machine Co.**
Frog, Switch & Mfg. Co.
***Jeffrey Mfg. Co.**
***Kennedy-Van Saun Mfg. and Eng. Corp.**
McLanahan and Stone Corp.
***Traylor Engr. & Mfg. Co.**
***Universal Crusher Co.**

Crushers (Cone)
***Nordberg Mfg. Co.**

Crushers (Hammer)
***Allis-Chalmers Mfg. Co.**
***American Pulverizer Co.**
***Austin-Western Road Machy. Co.**
***Birdsboro Steel Fdry. & Machine Co.**
***Brooks Equip. & Mfg. Co.**
Carnegie-Illinois Steel Corp.
***Dixie Machinery Mfg. Co.**
***Gruendler Crusher & Pulverizer Co.**
***Jeffrey Mfg. Co.**
***Kennedy-Van Saun Mfg. and Eng. Corp.**
Sturtevant Mill Co.
***Universal Crusher Co.**
***Williams Patent Crusher & Pulverizer Co.**

Crushers (Jaw and Gyratory)
***Allis-Chalmers Mfg. Co.**
***Austin-Western Road Machy. Co.**
Bacon, Inc., Earle C.
***Birdsboro Steel Fdry. & Machine Co.**
Brooks Equip. & Mfg. Co.
***Gruendler Crusher & Pulverizer Co.**
***Jeffrey Mfg. Co.**
***Kennedy-Van Saun Mfg. and Eng. Corp.**
Lewistown Foundry & Machine Co.
New Holland Machine Co.
***Nordberg Mfg. Co.**
Smith Engr. Works
***Traylor Engr. & Mfg. Co.**
***Universal Crusher Co.**

Crushers (Laboratory)
***Birdsboro Steel Fdry. & Machine Co.**

Crushers (Ring)
***American Pulverizer Co.**
***Williams Patent Crusher & Pulverizer Co.**

Crushers (Roll)
***Allis-Chalmers Mfg. Co.**
***American Pulverizer Co.**
***Austin-Western Road Machy. Co.**
***Birdsboro Steel Fdry. & Machine Co.**
***Brooks Equip. & Mfg. Co.**
***Gruendler Crusher & Pulverizer Co.**
***Jeffrey Mfg. Co.**
***Kennedy-Van Saun Mfg. and Eng. Corp.**
***Link-Belt Co.**
McLanahan and Stone Corp.
New Holland Machine Co.
***Robins Conveying Belt Co.**
***Universal Crusher Co.**
***Williams Patent Crusher & Pulverizer Co.**

Crushers (Rotary)
***Allis-Chalmers Mfg. Co.**
***American Pulverizer Co.**
***Austin-Western Road Machy. Co.**
Jackson & Church Co.
New Holland Machine Co.
***Williams Patent Crusher & Pulverizer Co.**

Crushing Rolls
***Allis-Chalmers Mfg. Co.**
***Austin-Western Road Machy. Co.**
Babcock & Wilcox Co.
***Birdsboro Steel Fdry. & Machine Co.**
***Jeffrey Mfg. Co.**
***Kennedy-Van Saun Mfg. and Eng. Corp.**
***Link-Belt Co.**
McLanahan and Stone Corp.
New Holland Machine Co.
Sturtevant Mill Co.
***Traylor Engr. & Mfg. Co.**
***Williams Patent Crusher & Pulverizer Co.**

Cutter Heads (Dredging)
***Eagle Iron Works**

Detonators
Atlas Powder Co.

Diesel Engines (See Engines—Diesel)

Dipper Parts
Frog, Switch & Mfg. Co.

Dippers and Teeth (Power Shovel)
***Birdsboro Steel Fdry. & Machine Co.**
***Bucyrus-Erie Co.**
Frog, Switch & Mfg. Co.

Dragline Cableway Excavators
***Bucyrus-Erie Co.**
***Link-Belt Co.**
***Sauerman Bros., Inc.**

Dragline Excavators
***Austin-Western Road Machy. Co.**
***Bay City Shovels, Inc.**
***Bucyrus-Erie Co.**
Jackson & Church Co.
***Link-Belt Co.**
Northwest Engineering Co.

Draglines (Walking)
***Bucyrus-Monighan Co.**

Dredges
***Bucyrus-Erie Co.**
Hetherington & Berner, Inc.
***Morris Machine Works**

* See also information in the 1938 Pit and Quarry HANDBOOK.

Dredges (Cutter Head)
*Birdsboro Steel Fdry. & Machine Co.

Driers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
*Chicago Bridge & Iron Co.
Jackson & Church Co.
*Kennedy Van Saun Mfg. & Eng. Co.
Lewistown Fdry. & Machine Co.
McCarter Iron Works, Inc., The
McLanahan & Stone Corp.
*Traylor Eng. & Mfg. Corp.
Tyler Co., W. S.

Drill Bit Reconditioning
*Bucyrus-Erie Co.

Drill Bits
*Chicago Pneumatic Tool Co.

Drill Steel
*Chicago Pneumatic Tool Co.

Drilling Accessories
*Bucyrus-Erie Co.
*Chicago Pneumatic Tool Co.
Timken Roller Bearing Co.

Drilling Contractors
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Blast-Hole)
*Bucyrus-Erie Co.
*Chicago Pneumatic Tool Co.

Drills (Core)
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Diamond)
*Chicago Pneumatic Tool Co.
Hoffman Bros. Drilling Co.
Pennsylvania Drilling Co.

Drills (Drifting)
*Chicago Pneumatic Tool Co.

Drills (Hand Hammer)
*Chicago Pneumatic Tool Co.

Drills (Rock)
*Chicago Pneumatic Tool Co.
*Jeffrey Mfg. Co.

Drills (Sinking)
*Chicago Pneumatic Tool Co.

Drills (Stoping)
*Chicago Pneumatic Tool Co.

Drills (Wagon)
*Bucyrus-Erie Co.
*Chicago Pneumatic Tool Co.

Drills (Water Well)
*Bucyrus-Erie Co.

Drills (Well) (See Drills—Blast-Hole)

Drives (Multiple Belt, Chain, Rope)
*Allis-Chalmers Mfg. Co.

Dust Arresters
*Blaw-Knox Co.
*Dracco Corp.
*Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Collecting Systems
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Blaw-Knox Co.
*Dracco Corp.
*Parsons Engineering Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Conveying Systems
Allen-Sherman-Hoff Co.
*Blaw-Knox Co.
*Dracco Corp.
*Fuller Company
*Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Filters
Parsons Engineering Corp.
*Sly Mfg. Co., W. W.
*Western Precipitation Corp.

Dust Handling Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Dynamite (See Explosives)

Electrical Equipment
*Allis-Chalmers Mfg. Co.

Electrodes (Welding)
Stulz-Sickles Co.

Elevator Belting (See Belting)

Elevator Buckets (See Buckets—Elevator and Conveyor)

Elevators (See Conveyors and Elevators)

Elevators (Portable)
Barrett-Cravens Co.

Eliminators (Soft Stone) (See Soft Stone Eliminators)

Engineers
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
*Birdsboro Steel Fdry. & Machine Co.
*Fuller Company
Hetherington & Berner, Inc.
*Kennedy-Van Saun Mfg. and Eng. Corp.
McLanahan and Stone Corp.
*Robins Conveying Belt Co.
Separation Process Co.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
Wellman Engineering Co.

Engine Generator Sets
See Generator Sets (Engine).

Engines (Diesel)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
Cummins Engine Co.
Murphy Diesel Co., Ltd.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Division of the National Supply Co.

Engines (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
Cummins Engine Co.
Murphy Diesel Co., Ltd.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Division of the National Supply Co.

Engines (Steam)
*Morris Machine Works
*Nordberg Mfg. Co.

Excavating Machinery (See Shovels; Cranes; Buckets, etc.)

Excavators—Shallow Grading (Bucket Elevator Type)
*Haiss Mfg. Co., Geo.

Explosives
Atlas Powder Co.

Fabricating (Electric Arc and Oxy-Acetylene)
Stulz-Sickles Co.

Fans (Exhaust)
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Feeders
*Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
*Fuller Company
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.

Floor Sweeping Systems (Hydro Vacuum)
Allen-Sherman-Hoff Co.

Fuses (Detonating)
Atlas Powder Co.
*Ensign-Bickford Co.

Gas Producers
Wellman Engineering Co.

Gasoline Engines (See Engines—Internal-Combustion)

Gates (Bin) (See Bin Gates)

Gates (Clamshell)
*Haiss Mfg. Co., Geo.
*Link-Belt Co.

Gears (Herringbone)
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Gears and Pinions
*Birdsboro Steel Fdry. & Machine Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Gelatin (See Explosives)

Generator Sets (Engine)
Murphy Diesel Co., Ltd.
National Supply Co. of Del.
Superior Diesel Engine Division of the National Supply Co.

Generators (See Motors and Generators)

Glass Sand Equipment
Lewistown Foundry & Machine Co.

Grab Buckets (See Buckets—Clamshell, Orange - Peel, etc.)

Grapples
Owen Bucket Co.

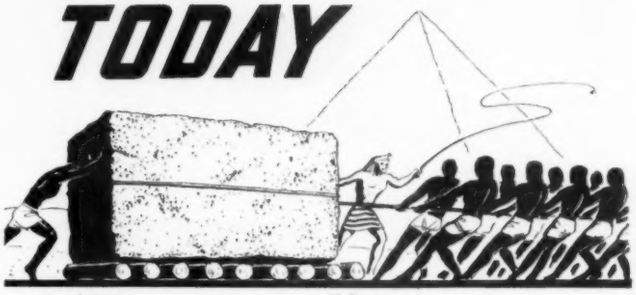
Grating (Steel)
*Blaw-Knox Co.

Grinding Balls (See Balls, Grinding)

Grizzly Feeders
*Traylor Engr. & Mfg. Co.

* See also information in the 1938 Pit and Quarry HANDBOOK.

IF WE BUILT THE PYRAMIDS *TODAY*



• Building the Pyramids would be comparatively simple for engineers of today with their modern methods, and efficient haulage equipment. Haulage methods have changed greatly throughout the centuries. Burdens have been transferred from men and beasts to self-powered equipment.

Where tonnage is large, haulage on steel rails continues to be the most efficient method. A Whitcomb Locomotive enables one man to haul many loads at one time—at lower cost per ton, and for more years than any other equipment. Whitcomb's sixty years' experience in building industrial locomotives results in design and construction that is superior in many ways. The extra quality reduces upkeep expense and increases your profit.

Without obligating you, our engineers will survey your haulage requirements and estimate the savings you can expect with a Whitcomb Locomotive.

CHOOSE YOUR TYPE OF POWER

Gasoline or Diesel Mechanical Drive
Gasoline or Diesel Electric Drive
Electric Storage Battery
Electric Trolley

THE WHITCOMB LOCOMOTIVE COMPANY
Plant at Rochelle, Illinois

Subsidiary of The Baldwin Locomotive Works. All sales made by The Baldwin Locomotive Works, Paschall Station Post Office, Philadelphia, Pennsylvania.

WHITCOMB LOCOMOTIVES

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Index to Advertisers on Page 112

Grizzlies
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
Manganese Steel Forge Co.
*Robins Conveying Belt Co.
Smith Engr. Works

Guards (Wire)
Manganese Steel Forge Co.
National Wire Cloth Co.

Guns (Hydraulic)
Hetherington & Berner, Inc.
Taylor Forge & Pipe Works

Hammer Mills (See Crushers—Hammer)

Hoists
*Chicago Pneumatic Tool Co.
Hetherington & Berner, Inc.
Jackson & Church Co.
*Jaeger Machine Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sauerman Bros., Inc.
Smith Engr. Works
*Sprout, Waldron & Co.

Hoppers
*Chicago Bridge & Iron Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Hose (Air, Steam and Water)
*Chicago Pneumatic Tool Co.
Gates Rubber Co.

Hose Couplings (See Couplings)

Hose (Petroleum)
Gates Rubber Co.

Hose (Radiator-Engine Cooling)
Gates Rubber Co.

Hydraulic Guns (See Guns—Hydraulic)

Idlers
*Allis-Chalmers Mfg. Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
Smith Engr. Works
*Sprout, Waldron & Co.

Indicators (Material Level)
*Fuller Company

Joist and Slab Machines (Concrete)
R & L Concrete Machinery Co.

Kiln Parts
*Birdsboro Steel Fdry. & Machine Co.

Kilns (Vertical)
*Chicago Bridge & Iron Co.

Kilns and Coolers (Rotary)
*Allis-Chalmers Mfg. Co.
*Chicago Bridge & Iron Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Kominuters
*Smidth & Co., F. L.

Ladders (Agitating Dredge)
*Eagle Iron Works

Ladders (Hydraulic Dredge)
*Eagle Iron Works

Lime and Hydrating Plants
*Chicago Bridge & Iron Co.

Lime-Handling Equipment
*Chicago Bridge & Iron Co.
*Fuller Company
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Robins Conveying Belt Co.
*Traylor Engr. & Mfg. Co.

Lime Kilns
*Chicago Bridge & Iron Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.

Lime Putty Plants
*Chicago Bridge & Iron Co.

Linings (Ball- and Tube-Mill) (See Mill Liners and Linings)

Loaders and Unloaders
*Bucyrus-Erie Co.
*Fuller Company
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Locomotives (Diesel)
Davenport Locomotive Works
*Whitcomb Locomotive Co.

Locomotives (Diesel-Electric)
Davenport Locomotive Works
*Whitcomb Locomotive Co.

Locomotives (Electric, Gas and Steam)
Davenport Locomotive Works

Locomotives (Gas-Electric)
Davenport Locomotive Works
*Whitcomb Locomotive Co.

Locomotives (Oil-Electric)
Davenport Locomotive Works
*Whitcomb Locomotive Co.

Locomotives (Storage Battery)
Davenport Locomotive Works

Locomotives (Trolley-Battery)
Davenport Locomotive Works
*Jeffrey Mfg. Co.

Magnetic Pulleys (See Pulleys, Magnetic)

Magnetic Separators
*Birdsboro Steel Fdry. & Machine Co.

Manganese Steel
Frog, Switch & Mfg. Co.
Manganese Steel Forge Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.

Manganese Steel Castings
Frog, Switch & Mfg. Co.

Mechanical Rubber Goods
Gates Rubber Co.

Mill Liners and Linings
Babcock & Wilcox Co.
Carnegie-Illinois Steel Corp.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Smidth & Co., F. L.
*Traylor Engr. & Mfg. Co.

Mills (Ball, Tube, etc.)
*Traylor Engr. & Mfg. Co.

Mills (Grinding) (See also Crushers—Hammer)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
Babcock & Wilcox Co.
*Birdsboro Steel Fdry. & Machine Co.
*Brooks Equip. & Mfg. Co.
Jackson & Church Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Fdry. & Mach. Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
*Sprout, Waldron & Co.
*Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Mills (Pug)
McCarter Iron Works, Inc., The

Minerals Separation (Cement) (See Cement Minerals Separation)

Mixers
McCarter Iron Works, Inc., The
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Motor Trucks
General Motors Corp.

Motors & Generators
*Allis-Chalmers Mfg. Co.

Motors (Internal-Combustion) (See Engines — Internal-Combustion)

Moulds and Forms (Concrete)
Dunn Mfg. Co., W. E.
Multiplex Concrete Machinery Co.
R & L Concrete Machinery Co.
Stearns Mfg. Co.

Netting (Locomotive Stack)
*Tyler Co., W. S.

Nozzles (Gravel Washing)
*Deister Concentrator Co.

Nozzles (Hydraulic) (See Guns—Hydraulic)

Nozzles (Spray)
*Deister Concentrator Co.

Pallets
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Pans (Wet and Dry)
Jackson & Church Co.

Partitions (Wire)
National Wire Cloth Co

Paving Mixers
*Jaeger Machine Co.

Perforated Metal Plates
*Allis-Chalmers Mfg. Co.
Chicago Perforating Co.
*Sprout, Waldron & Co.

Pipe, Dredge (Floating and Shore)
*Chicago Bridge & Iron Co.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Flanges
Hetherington & Berner, Inc.
Naylor Pipe Co.
Taylor Forge & Pipe Works

Pipe Fittings
Hetherington & Berner, Inc.

Pipe Forms (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
R & L Concrete Machinery Co.
Universal Concrete Pipe Co.

Pipe Machines (Concrete)
Concrete Pipe Machinery Co.
Quinn Wire & Iron Works
R & L Concrete Machinery Co.
Universal Concrete Pipe Co.

Pipe (Spiral)
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Pipe (Water, Gas, Low Pressure Steam)
Hetherington & Berner, Inc.

Pipe (Welded)
*Chicago Bridge & Iron Co.
Naylor Pipe Co.
Taylor Forge & Pipe Co.

Plants (Aggremeter) (See Aggremeter Plants)

Plug Valves (See Valves)

Pneumatic Conveying Systems (See Conveyors—Pneumatic)

Pneumatic Drills (See Drills, Rock)

Poidometers
Schaffer Poidometer Co.

Portable Conveyors
*Fuller Company
Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Universal Crusher Co.

Portable Crushing and Screening Plants
*Austin-Western Road Machy. Co.
*Birdsboro Steel Fdry. & Machine Co.
Brooks Equip. & Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Portable Engines (See Engines —Internal Combustion)

Portable Loaders (See Loaders and Unloaders)

Portable Washing Plants
*Universal Crusher Co.

Powder, (Black, Blasting) (See Explosives)

Power Shovels (See Shovels, Electric, Internal-Combustion and Steam)

Power Tampers (Concrete)
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Power Units (Internal-Combustion)
Caterpillar Tractor Co.
*Chicago Pneumatic Tool Co.
Cumins Engine Co.
Murphy Diesel Co., Ltd.
National Supply Co. of Del.
*Nordberg Mfg. Co.
Superior Diesel Engine Division of the National Supply Co.

Precipitators
*Western Precipitation Corp.

Pre-formed Wire Rope
*American Cable Division of The American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
*Leschen & Sons Rope Co., A.

Presses (Brick and Block)
Jackson & Church Co.

Press Machines (Hand, Concrete)
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Proportioning Equipment
*Blaw-Knox Co.
Jackson & Church Co.
*Jaeger Machine Co.
Schaffer Poidometer Co.

Pulleys
*Birdsboro Steel Fdry. & Machine Co.
Sprout, Waldron & Co.

Pulleys (Magnetic)
*Sprout, Waldron & Co.

Pulleys (Wing)
*Sprout, Waldron & Co.

Pulverized Fuel Systems
Babcock & Wilcox Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.

Pulverizers (See also Crushers, Mills, etc.)
*Allis-Chalmers Mfg. Co.
*American Pulverizer Co.
*Austin-Western Road Machy. Co.
Babcock & Wilcox Co.
*Birdsboro Steel Fdry. & Machine Co.
*Brooks Equip. & Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
New Holland Machine Co.
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc.
*Smidth & Co., F. L.
Sturtevant Mill Co.
Traylor Engr. & Mfg. Co.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Pump Valves (See Valves, Pump)

Pumps (Air-Lift)
*Chicago Pneumatic Tool Co.
*Fuller Company

Pumps (Bulk Cement)
*Fuller Company

Pumps (Cement Slurry)
Allen-Sherman-Hoff Co.
*Morris Machine Works
*Smidth & Co., F. L.

Pumps (Centrifugal)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Jaeger Machine Co.
*Morris Machine Works
Peerless Pumps Division of The Food Machy. Corp.

Pumps (Dewatering)
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machy. Corp.

Pumps (Dredging)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
*Birdsboro Steel Fdry. & Machine Co.
Bucyrus-Erie Co.
Erie Pump & Engine Works
Hetherington & Berner, Inc.
*Morris Machine Works

Pumps (Sand and Gravel)
Allen-Sherman-Hoff Co.
*Allis-Chalmers Mfg. Co.
Erie Pump & Engine Works

*See also information in the 1938 Pit and Quarry HANDBOOK.

No "Dead-Head" Metal Rides in

WILLIAMS *Buckets*

● Williams Buckets don't rely on sheer mass and dead weight for digging power and stamina. Williams welded construction cuts down weight without sacrifice of power and durability.

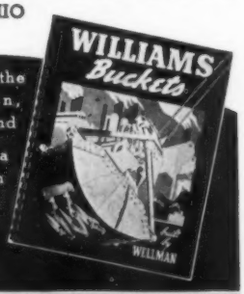
Williams power mechanisms give the bucket tremendous digging ability. They bite quickly and deeply to get full capacity loads—they work faster—get the job done quicker because you are moving dirt—not inert metal.

THE WELLMAN ENGINEERING COMPANY
7014 CENTRAL AVENUE • CLEVELAND, OHIO

The Williams line includes Power-Arm, Multiple Rope, Power Wheel, Single Line Hook-On, and Dragline Buckets.

Distributors located in all parts of the country are competent to render valuable field service.

Tell us the condition, and we'll send you **FREE**, a special bulletin describing the specific Williams Bucket best fitted to the job.



built by WELLMAN . . .

To Meet Your Fine Stone Requirements Use a Secondary

KENNEDY BALL BEARING GEARLESS CRUSHER

To produce the fine cubical stone that concrete and highway work demands you need a Kennedy Secondary Gyratory Crusher.

When set to 3/8" the No. 19 crusher will give you 24 tons per hour, the No. 25 will produce 35 tons per hour, and the No. 37 has a capacity of 60 tons per hour.

The Kennedy Crushers keep up these tonnages month-after month without costly breakdowns and repairs. Your power bills go down because of the exclusive Ball Bearing Gearless drive of the Kennedy Crushers.

Special features of design insure a high tonnage of properly sized stone. This is partly due to our patented 3-angle concaves crushing the material against a solid 2-angle mantle.

There's a Kennedy Crusher to solve your problem and produce the stone you can sell. Why not write for our new Bulletin No. 35, 2nd Edition, and learn more about these machines?

Kennedy Van Saun MFG. & ENG. CORP.
2 Park Ave., New York, N.Y.

BUYERS' GUIDE

A Directory of Pit and Quarry Advertisers Indexed According to Product.

Although every effort is made to insure accuracy and completeness in these listings, the publisher cannot accept responsibility for errors or omissions. Any mistakes discovered will gladly be rectified.

Index to Advertisers on Page 112

Hetherington & Berner, Inc.
*Morris Machine Works

Pumps (Sump)
*Chicago Pneumatic Tool Co.
Peerless Pumps Division of The Food Machy. Corp.

Pumps (Turbine)
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machy. Corp.

Pumps (Vacuum)
*Chicago Pneumatic Tool Co.
*Fuller Company

Pumps (Vertical)
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machy. Corp.

Pumps (Well)
Erie Pump & Engine Works
*Morris Machine Works
Peerless Pumps Division of The Food Machy. Corp.

Racks (Curing)
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Ready-Mixed Concrete Plants
*Jaeger Machine Co.

Rock Drills (See Drills—Rock)

Rod Mills
Jackson & Church Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
*Traylor Engr. & Mfg. Co.

Rods (Welding)
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Stulz-Sickles Co.

Rope (Wire) (See Wire Rope)

Sand and Gravel Handling Equipment
*Jeffrey Mfg. Co.
*Link-Belt Co.

Sand, Lime, Brick Machinery
Jackson & Church Co.

Sand Separators
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
Simplicity Engr. Co.
Smith Engr. Works

Sand-Settling Tanks
*Chicago Bridge & Iron Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Nordberg Mfg. Co.
Smith Engr. Works

Scales
*Merrick Scale Mfg. Co.

Scales (Track and Truck)
*Merrick Scale Mfg. Co.

Scrapers (Power Drag)
*Austin-Western Road Machy. Co.
Continental Roll & Steel Fdry. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Scrapers (Wagon)
*Bucyrus-Erie Co.
Continental Roll & Steel Fdry. Co.

Screens
*Allis-Chalmers Mfg. Co.
Bacon, Inc., Earle C.
Carnegie-Illinois Steel Corp.
Chicago Perforating Co.
Cleveland Wire Cloth & Mfg. Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Eagle Iron Works
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
McLanahan and Stone Corp.
National Wire Cloth Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Screens (Vibrating or Shaking)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
*Deister Concentrator Co.
*Deister Machine Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Machine Co.
*Link-Belt Co.
McLanahan and Stone Corp.
New Holland Machine Co.
*Nordberg Mfg. Co.
*Robins Conveying Belt Co.
Screen Equipment Co.
Simplicity Engr. Co.
Smith Engr. Works
*Sprout, Waldron & Co.
Sturtevant Mill Co.
*Tyler Co., W. S.
*Universal Crusher Co.
*Williams Patent Crusher & Pulverizer Co.

Scrubbers
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.

Separators (Air) (See Air Separators)

Separators (Slurry)
*Smidth & Co., F. L.

Sheaves
*Allis-Chalmers Mfg. Co.
*Eagle Iron Works
Gates Rubber Co.
*Gruendler Crusher & Pulverizer Co.
*Haiss Mfg. Co., Geo.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Sprout, Waldron & Co.

Shovels (Electric, Internal-Combustion and Steam)
*Austin-Western Road Machy. Co.
*Bay City Shovels, Inc.
*Bucyrus-Erie Co.
*Link-Belt Co.
Northwest Engineering Co.

Silos
*Chicago Bridge & Iron Co.
*Smidth & Co., F. L.

Skip Hoists and Skips
*Allis-Chalmers Mfg. Co.
Hetherington & Berner, Inc.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Speed Reduction Units
*Link-Belt Co.

Spouts (See Chutes and Chute Liners)

Sprays
*Deister Concentrator Co.

Sprockets and Chain
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sprout, Waldron & Co.

Stackers
*Jeffrey Mfg. Co.

Steel (Alloy)
(See Alloys—Steel)

Steel (High Tensile)
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.

Steel (Open Hearth)
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.

Steel Grating (See Grating, Steel)

Steel Plate Construction
*Chicago Bridge & Iron Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Hetherington & Berner, Inc.
Manganese Steel Forge Co.
*Sprout, Waldron & Co.

Stokers
Babcock & Wilcox Co.

Stone Grapples
Owen Bucket Co.

Storage Equipment
*Chicago Bridge & Iron Co.
*Haiss Mfg. Co., Geo.
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Sauerman Bros., Inc.

Sweeping Systems
Allen-Sherman-Hoff Co.

Tamp Machines (Hand, Concrete)
Multiplex Concrete Machinery Co.
Stearns Mfg. Co.

Tanks
*Chicago Bridge & Iron Co.
Jackson & Church Co.
*Link-Belt Co.
*Traylor Engr. & Mfg. Co.

Tanks (Elevated Steel)
*Chicago Bridge & Iron Co.

Tanks (Sand-Settling)
*Chicago Bridge & Iron Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Smith Engr. Works

Testing Sieves and Shakers
*Tyler Co., W. S.

Tools (Drill) (See Drilling Accessories)

Track Shifters
*Nordberg Mfg. Co.

Tractors
*Allis-Chalmers Mfg. Co.
Caterpillar Tractor Co.

Trailers
General Motors Corp.

Trailers (Dump)
*Le Tourneau, Inc., R. G.

Trailers (Industrial)
General Motors Corp.

Tramways (Aerial)
*Roebling's Sons Co., John A.

Transformers
*Allis-Chalmers Mfg. Co.

Transmission Belting (See Belting)

Transmission Machinery
*Allis-Chalmers Mfg. Co.
*Gruendler Crusher & Pulverizer Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Trippers
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.

Truck Cranes (See Cranes)

Truck Mixers
*Blaw-Knox Co.
*Jaeger Machine Co.
Smith Co., T. L.

Trucks and Trailers
(See Motor Trucks)

Trucks (Lift or Elevating)
Barrett-Cravens Co.

Tube-Mills (See Mills—Ball, Tube, etc.)

Underground Loaders
*Allis-Chalmers Mfg. Co.

Unloaders (Box Car)
*Fuller Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.

Valves (Pump)
Taylor Forge & Pipe Works

Variable Speed Reducers or Transmissions
*Link-Belt Co.

Vibrating Screen Plate
Chicago Perforating Co.
*Jeffrey Mfg. Co.
*Link-Belt Co.
Manganese Steel Forge Co.

Vibrating Screens (See Screens—Vibrating)

Vibrators
*Jeffrey Mfg. Co.
*Tyler Co., W. S.

Wagon Scrapers
Continental Roll & Steel Fdry. Co.

Wagons (Dump)
*Austin-Western Road Machy. Co.
*Le Tourneau, Inc., R. G.

Washers (Sand, Gravel and Stone)
*Allis-Chalmers Mfg. Co.
*Austin-Western Road Machy. Co.
*Eagle Iron Works
*Haiss Mfg. Co., Geo.
*Kennedy-Van Saun Mfg. and Eng. Corp.
Lewistown Foundry & Mach. Co.
*Link-Belt Co.
McLanahan and Stone Corp.
*Smidth & Co., F. L.
Smith Engr. Works
*Traylor Engr. & Mfg. Co.
*Tyler Co., W. S.
*Universal Crusher Co.

Weighing Equipment (Automatic)
*Blaw-Knox Co.
*Fuller Co.
*Jaeger Machine Co.
*Merrick Scale Mfg. Co.
Schaffer Poidometer Co.

Welding Bars, Wedge and Applicator (Nickel - Manganese Steel)
Stulz-Sickles Co.

Welding and Cutting Equipment
Stulz-Sickles Co.

Welding Rods
Stulz-Sickles Co.

Welding Service
Stulz-Sickles Co.

Welding Supplies
*Roebling's Sons Co., John A.

Wheels (Car)
Jackson & Church Co.

Winches and Capstans
*Jeffrey Mfg. Co.
*Link-Belt Co.
*Robins Conveying Belt Co.
*Sprout, Waldron & Co.

Wire and Cable (Electric)
*Roebling's Sons Co., John A.

Wire Cloth
Cleveland Wire Cloth & Mfg. Co.
Ludlow-Saylor Wire Co.
Manganese Steel Forge Co.
National Wire Cloth Co.
*Robins Conveying Belt Co.
*Roebling's Sons Co., John A.
*Tyler Co., W. S.

Wire Rope
*American Cable Division of The American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.

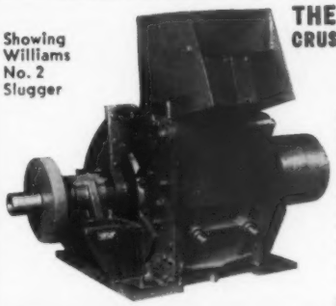
Wire Rope Fittings
*American Cable Division of The American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.

Wire Rope Slings
*American Cable Division of The American Chain & Cable Co., Inc.
Broderick & Bascom Rope Co.
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Leschen & Sons Rope Co., A.
*Roebling's Sons Co., John A.

Wire (Welding)
Gilmore Wire Rope Div. of Jones & Laughlin Steel Corp.
Manganese Steel Forge Co.
*Roebling's Sons Co., John A.

Worm Gears (See Gears and Pinions)

* See also information in the 1938 Pit and Quarry HANDBOOK.



Showing Williams No. 2 Slugger

THE WILLIAMS "SLUGGER" CRUSHER *for* MAKING 1¼", ¾" OR AGSTONE HANDLES LARGE STONE

Rows of heavy, free swinging, fast revolving hammers, crush the material by impact until of proper size to pass through the gates. By reducing large rock to 1¼", ¾" or agricultural size in one operation, the "Slugger" has enabled operators to produce these sizes at a very low cost per ton and with small investment.

WILLIAMS PATENT CRUSHER AND PULVERIZER COMPANY
802 St. Louis Ave. - St. Louis, Mo.

WILLIAMS
PATENT CRUSHERS GRINDERS SHREDDERS

Lewistown Foundry Products
ARE
Performance-Tested

BUCKET ELEVATORS
REVOLVING SCREENS
CRUSHERS DRY PANS

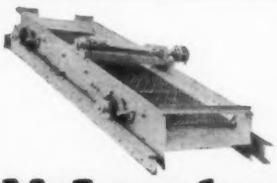
Lewistown Foundry & Machine Co.
Lewistown, Pa.

Economical

On All Material Handling Machines. *Try It!*

BRODERICK & BASCOM ROPE CO., ST. LOUIS

Factories:
St. Louis - Seattle - Peoria
Branches:
New York - Chicago - Seattle - Portland - Houston



McLanahan' Equipment

Single and double roll and jaw crushers, hammer mills, super dry pans,—steel log washers and scrubbers, sand drags, revolving and vibrating screens, elevators, conveyors, dryers, jigs, hoists,—complete portable, semi-portable and stationary crushing, screening and washing plants for different capacities of any materials.

McLanahan & Stone Corporation
Continuously in Business Since 1835
Hollidaysburg, Pennsylvania

INSURE DRASTIC SAVINGS in Your HAULAGE OPERATIONS

A DAVENPORT INDUSTRIAL LOCOMOTIVE gives you flexible, smooth performance and easy handling *plus* important fuel economy and many-year dependability. Cut your costs and boost your profits the "Davenport Way."

These modern units are available in many types from 2½ to 100 tons. May we suggest that you submit your requirements. Our engineers will gladly develop dependable recommendations at no cost to you. You'll be surprised to know how much your Davenport can save for you. DAVENPORT LOCOMOTIVE WORKS (A Division of Davenport Besler Corporation), Davenport, Iowa.

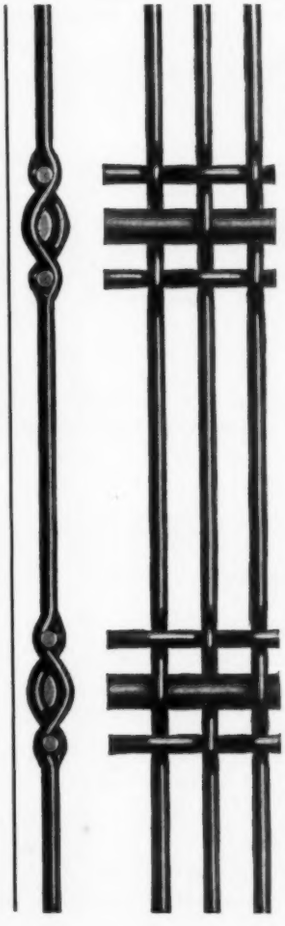
Write TODAY for Descriptive Catalog

PLANT AND MAIN OFFICE—DAVENPORT, IOWA
New York and Export Office—30 Church St.
Cable Address "Brosites"

DAVENPORT — Builders of Industrial Locomotives Sold All Over the World

DAVENPORT LOCOMOTIVE WORKS

GASOLINE • DIESEL • STEAM
DIESEL ELECTRIC • GAS ELECTRIC



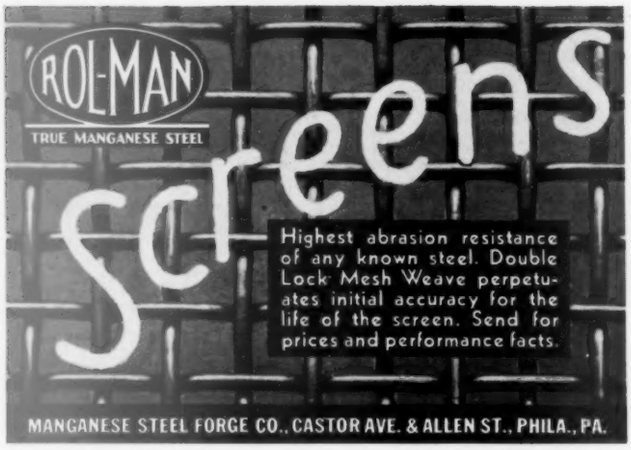
STA-TRU

Long-Mesh Woven Wire Screens

made to work under tension and vibration.

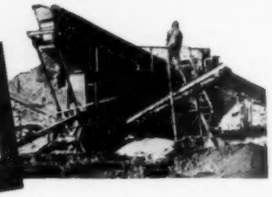
The straight stay - bars carry ALL the tension. The crimps in the round wires can not be stretched or broken. The screen can not be caused to sag or split by the pull of the tensioning device.

LUDLOW-SAYLOR
WIRE CO. ST. LOUIS


ROL-MAN
TRUE MANGANESE STEEL
Screens
Highest abrasion resistance of any known steel. Double Lock Mesh Weave perpetuates initial accuracy for the life of the screen. Send for prices and performance facts.
MANGANESE STEEL FORGE CO., CASTOR AVE. & ALLEN ST., PHILA., PA.

CRUSHING EQUIPMENT

AUSTIN-WESTERN



A-W's complete line of crushing, screening and gravel washing equipment permits the selection of the equipment best suited to any requirement.

A-W Portable Units combine capacity, compactness and easy, fast portability. Built with over-size shafts and roller bearings throughout, they have a world-wide reputation for low operating cost, big output and trouble-free operation at remote locations.

THE AUSTIN-WESTERN ROAD MACHINERY CO.
1841 Barrows St.
AURORA, ILLINOIS

AIR COMPRESSORS
ALL TYPES & SIZES

ROCK DRILLS
SINKERS — DRIFTERS
WAGON DRILLS
DIAMOND DRILLS

CHICAGO PNEUMATIC TOOL COMPANY
6 EAST 44th STREET NEW YORK, N. Y.

USE
MANGANAL
Reg. U. S. Patent Office
Patents # 1,876,738—1,947,167—2,021,945
11 to 13½% Nickel Manganese Steel
HOT ROLLED PLATES
3/16" TO 1" THICK
FOR LINERS, FABRICATING NEW PARTS, PATCHING BY WELDING, ETC.
SOLE PRODUCERS
STULZ-SICKLES CO. NEWARK, N. J.

THERE MUST BE A REASON

FOR

CONTINUED POPULARITY

For nearly nine years Pit and Quarry has led all other papers in this field in subscriptions among producers. It is the most popular paper—with its popularity constantly growing, as is shown by the increasing number of subscriptions and the increasing margin of lead.

The reason? At no time has Pit and Quarry compromised with its high editorial standards. It has held its editorial staff, and kept its field editor on the road, wearing out a car in one to two years. The illustrations have always been plentiful, the articles easy to read.

Costly to do this? Yes, it is. But it has been worth the cost, for producers realize that Pit and Quarry has worked *with* them. Savings effected by change from biweekly to monthly publication have been passed on in the form of a reduced subscription price—not pocketed. And the high percentage of subscribers who renew their subscription attests their loyalty to a publication understanding their problems and working *with* them.

The subscription price is still only one dollar for a full year's service. If you are not already a subscriber, why not send in a dollar and learn why other producers find Pit and Quarry so valuable? The cost is so small—the results so large—don't delay.

Return This Coupon To-day—Start Your Subscription with the November Issue.

PIT AND QUARRY PUBLICATIONS,
538 So. Clark Street, Chicago, Illinois.

Inclosed find remittance for which enter my subscription to Pit and Quarry for 1 year ($1.00)..... starting with the *November* issue. (Foreign add $1.00 per year.)

My Name..... Title.....

Company Name .....

Send to (Address).....

We Produce .....

SAUERMAN LONG RANGE MACHINES
For Digging, Conveying, Stockpiling

With a Sauerman Slackline or Drag Scraper you can dig to a depth of several hundred feet, whether in dry ground or under water, and haul the excavated material any distance up to 1500 ft. at a cost of a few cents per cu. yd.

Sixteen different sizes with handling capacities from 10 to 600 cu. yds. per hour. *Catalog on request.*

SAUERMAN BROS., Inc.
434 S. Clinton St., CHICAGO

MORRIS

CENTRIFUGAL PUMPS • DREDGES • STEAM ENGINES

For abrasive mixtures, corrosive liquids, or clear water. Any capacity, head, or method of drive.

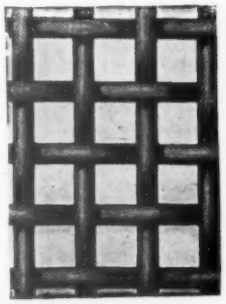
For sand and gravel production, water supply reservoirs, filling in, or waterways improvements.

Vertical reciprocating type, single and double cylinders, compound and triple expansion, 3 to 1000 hp.

Write for Bulletins

MORRIS MACHINE WORKS
Baldwinsville, N. Y.

FIVE STAR FEATURES
of Nat-aloy Wire Cloth



- ★ Wears five to ten times as long as cloth made of ordinary steel
- ★ Withstands vibration without crystallization
- ★ Super-tough to resist abrasion
- ★ Maintains accuracy throughout life of screen
- ★ Economical in price and serviceability

Attractive Prices
Immediate Shipments from Stock

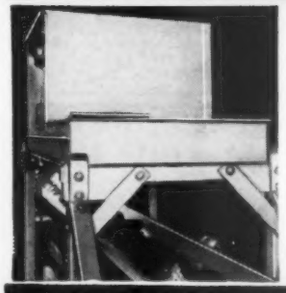
NATIONAL WIRE CLOTH CO., INC.
St. Paul, Minn. Write for new catalog No. 36.

SIMPLICITY SCREENS

- The rugged simplicity of these Gyrating Screens is responsible for the new low costs in grading sand, gravel and aggregates, now being obtained by operators using this modern equipment. Twelve sizes available in single, double and triple deck, also tandem combinations.

SIMPLICITY Engineering Co.
DURAND MICHIGAN

WEIGHING while conveying



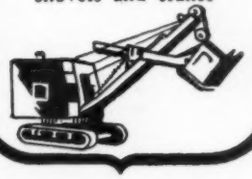
WITH THE
MERRICK WEIGHTOMETER

Applicable to any size belt conveyor, horizontal or inclined. An accurate and dependable means of keeping constant check on production.

WRITE FOR BULLETIN 375

MERRICK SCALE M'FG. CO.
PASSAIC NEW JERSEY

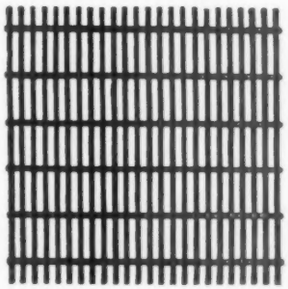
BAY CITY SHOVELS
12 Sizes
3/8 to 1¼ Yard
Also truck mounted shovels and cranes



The many exclusive and time tested developments in BAY CITY equipment have made them real *yardage producers* which means lower excavating costs.

Write for new "COMPARE" booklet.

BAY CITY SHOVELS, Inc., Bay City, Mich.



Rolled Slot

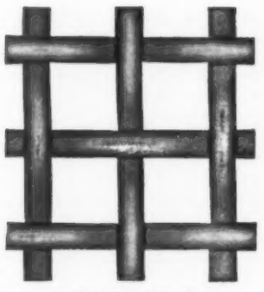
ALLOY No. 2

A super wearing Steel developed to resist the abrasion and vibration of modern screening demands.

"CLEVELAND" SCREENS

A wire cloth of guaranteed accuracy backed by fine workmanship and an effort to satisfy.

Available in Square Mesh and Rolled Slot. A trial will convince you of the superiority.



2 Mesh .162 Ga.

THE CLEVELAND WIRE CLOTH & MFG. COMPANY
574 E. 78th St. CLEVELAND, OHIO

CRUSHERS—ELEVATORS—SCREENS SAND WASHERS—PUMPS CONVEYORS

1—7½"x13" CHAMPION No. 3 Jaw Crusher.
6—BRAND NEW Jaw Crushers 9"x15" and 10"x20".
1—9"x16" CLIMAX No. 2 Jaw Crusher.
1—12"x26" CHAMPION No. 6 Jaw Crusher.
1—13"x30" FARREL 10-B Jaw Crusher.
1—24"x30" FARREL 14-B Jaw Crusher.
1—Pr. 24"x14" WEBB CITY Crushing Rolls.
1—Pr. 36"x16" STURTEVANT Balanced Rolls.
2—M-20 QUAKER CITY Hammer Mills.
1—No. 2 MEAD Disc Mill.

JOHNSON AND HOEHLER, INC.
Lansdowne, Penna.

1—24" x 36" Type B Farrell Jaw Crusher.
1—18" x 36" Type B Farrell Jaw Crusher.
1—10" x 36" Type B Farrell Jaw Crusher.
1—6" x 36" Type B Farrell Jaw Crusher.
1—15" x 30" Reliance Jaw Crusher.
1—10A Telsmith Gyratory Crusher.
1—40 Telsmith Gyratory Reduction Crusher.
1—No. 6 Champion Jaw Crusher.
1—30" x 14" Sturtevant Rolls.
3—100 H.P. G. E. Vertical Motors.
1—Hammer Mill.

BLUE BALL MACHINE WORKS
Blue Ball, Pennsylvania

CRUSHERS

GYRATORY: 42" McCully with 80% brand new parts. 12-N Allis-C. 36" Superior McCully like new. 20" Superior McCully reduced to 16". Telsmith Nos. 4, 5, 6 & 9. Gates Nos. 10, 9, 8, 7½, 6, 5, 4 & 3. Also Austins, Kennedys and Traylors.
JAW TYPE: Traylor 84x66, 60x48, 30x60 & 24x72. Buchanan 52x72 & 30x42. Farrel 24x36 & 30x36. F&M 24x36. Good Roads 1030 & 1040. Bakstad 3-jaw 8x20. Misc. 9x16, 8x36, 15x36, Etc.
REDUC. TYPE: 6, 10 & 18" Super. McCully. 2', 3' & 4' Symons Cone. 7" & 10" Newhouse. Etc.
ROLLS: Allis-C. 36x16, 40x15, & 54x24. Jeff. 30x30.
HAMMERMILLS: Williams Nos. 3, 4, 5 & 9. Others.
MILLS: Kennedy Ball 4x6, 5x6 & 5x8. Kent 34x7". 48" Fuller-Lehigh. 5'x22' Bonnot and others.

MISCELLANEOUS ITEMS

Barges, Bins, Buckets, Boilers, Cableways, Cars, Compressors, Conveyors, Cranes, Dryers, Derricks, Draglines, Dredges, Drills, Engines, Excavators, Elevators, Generators, Hoists, Kilns, Loaders, Locomotives, Motors, Pipe, Pumps, Rail, Scales, Screens, Slacklines, Shovels, Tanks, Trucks, Tractors, and many other items located throughout the United States at Bargain Prices.

ALEX T. McLEOD
7229 ROGERS AVENUE CHICAGO

Jaw Crushers—4"x8" up to 66"x84".
Crushing Rolls—16"x10" up to 54"x24"—Gyratory Crushers
Ring Roll Mills—No. 0 and No. 1.
Swing Hammer Mill.
Rotary Fine Crushers—No. 1, No. 0.
Direct Heat Rotary Dryers—3½'x25', 4'x30', 5'x30', 5½'x40', 6'x50', 7'x50' and 8'x50'.
Semi-indirect heat Dryers—4'x30', 4½'x26', 5'x30' and 8½'x75'.
Cement Kilns—3' up to 8' diameter.
Hardinge—Marcy & Fuller-Lehigh Mills.
Raymond Mills—No. 00, No. 0 and No. 1 and No. 5 roll
Tube—Rod and Ball Mills—3' to 8' diameter.
Vibrating Screens—Air Separators.
1—4'x4' Ball Mill.
New Dryers built for all purposes.

W. P. HEINEKEN
95 Liberty St., N. Y. Tel.: Barclay 7-7298

FOR SALE

One Sauerman Slackline Cableway complete with 80 ft. steel mast, one yard bucket, 80 H.P., two speed hoist, electric. All Sauerman equipment throughout. None Better, extra good bargain.

JOHN JONES & SONS GRAVEL CO.
Indianapolis - - - - - - Indiana

36" Telsmith Gyrasphere or Cone. Brand New.
42x48" Traylor & 22x50" Champion Jaw.
No. 19 Kennedy Gearless Fine Reduction type.
2—6" McCully Fine Reduction Crushers.
120, 150 & 200 HP Fairbks., Diesels & Gens.
200 & 300 KW Skinner Uniflow Steam Units.

Mississippi Valley Equipment Co.
501 Locust St. St. Louis, Mo.
Hoists — Derricks — Cars — Locomotives — Cranes
Rail — Tanks — Compressors — Crushers

SELECTED ITEMS OF MODERN EQUIPMENT

Penn Trojan Hammermill, 50-hp. direct elec.
Jeffrey "Junior" Belted Hammermill.
Kennedy 37 Gyra. Gearless Crusher, 50-hp.
Champion No. 6 Jaw Crusher, 12"x26" opening.
B.-G. 24" Reciprocating Plate Feeder, 3-hp.
5 Hummer 2-deck Vib. Screens, V-16 and V-40.
Link-Belt 1-deck 3x8 Vib. Screen, V-belt.
Leahy 2-deck 3x6 Vibrating Screen, Elect.
4—60" Link-Belt Automatic Sand Tanks.
Centrif. Electric Water Pumps, 3—50-hp.
10"x34' Closed Vert. Chain Bucket Elevator.
14"x32' Open Vert. Chain Bucket Elevator.
16"x75' Open Vert. Chain Bucket Elevator.
Manganese Pintle Chain, 6" Pitch, 400 Ft.
24"-g. Track & Switches. Flat & Dump Cars.
36" 4-ton Gas Locomotive & 6—2-yd. Cars.
Std. g. 8-ton Vulcan Gas Locomotive.
3 Storage Tanks, 10,000-gal. 2" Steam Coils.
Patterson Kelley Feed Water Heater, 800-hp.
2-Drum Gasoline Hoists, 20 and 40-hp.
1—Drum Variable Speed 60-hp. Mine Hoist.
I-R type XCB Air Compressor, 676 C.F.M.
I-R type ERI Air Compressor, 12x10 cyls.
Marion 1-yd. Electric Shovel, Caterpillars.
Star ¾ yd. Full-Revolving Gasoline Shovel.
45 Ft. Koehring Crane Boom, for type 301.
Hayward Clamshell Material Bucket, ½ yd.
Blaw-Knox Clamshell Digging Bucket, ¾ yd.
18"x35' Haiss Portable Belt Conveyor, gas.
14" to 36" wide Belt Conveyor Equipment.
24" Used Conveyor Belt, 5-ply, 2000 Feet.
150—42" Flat Idlers, for Picking Belt.
20"x7' Jeffrey Steel Apron Conveyor Feeder.
L-B Package Conveyor, 30"x32', steel frame.

G. A. UNVERZAGT
15 Park Row New York City

1—Bucyrus-Erie 41-B 1¼ yd. Steam Shovel No. 10095.
1—310 ft. Ingersoll-Rand Gasoline Air Compressor, mounted on rubber tired wheels.
1—Koehring 14-S Concrete Mixer, Leroi motor, steel wheels.
2—Whitcomb 4 Ton Gasoline Locomotives, 24" gauge.
2—Whitcomb 6 Ton Gasoline Locomotives, 24" gauge.
1—60x115 N.B. Vertical Boiler suitable for Marion 37 shovel.

Rit. 8359 **ROBERT H. BOYER** 302 Harrison Bldg.
Philadelphia, Pa.

REBUILT CONSTRUCTION EQUIPMENT

Air Compressors	Elec. Welders	Pneumatic Tools
Belt Conveyors	Gasoline & Elec. Hoists	Concrete Mixers
Concrete Vibrators		Plaster Mixers
Derricks	Concrete Buckets	Mortar Mixers
Elec. Motors & Controls	Material Elevator Platforms	Centrifugal Pumps
Saw Tables	Gasoline Engines	Pressure Pumps
		Storage Bins

UNITED HOISTING CO., INC.
Serving Construction Industry for 46 years.
175 Locust Avenue New York, N. Y.

¾ Yd. Crane & Dragline. Full revolving. A-1.
Lorain 75 Gas Shovel, Crane & Dragline. Low price.
½ Yd. Northwest Shovel. 1 Yd. Link-Belt comb.
Gas Locomotive Cranes—7½, 10, & 12 ton cap.
Sauerman Eqpmt.—Hoists, Buckets, etc., 1/3 to 4 yd.
Buckets—Prac. complete line, all kinds—1/3 to 8 yd.
Small Barber-Greene Loader, overhauled. Also No. 42.
24x26 Link-Belt Coal Crusher. Portable conveyors, etc.
Crawler Type Coal Conveyor & Loader, gas or elec.

JAMES WOOD
53 West Jackson Blvd. Chicago, Ill.

Rebuilt Equipment

AUSTIN-WESTERN (Badger) ⅜ yard Crawler Type Shovel.
P&H Model 300 Crawler ½ yard Shovel; Waukesha Gas Motor.
KOEHRING No. 1 Crawler Type Crane. 40 Ft. Boom.
McMYLER 35-ton Type J Locomotive Crane; 50' Boom; Air Brakes; Double Drums.
AMERICAN 40 ton 4 Wheel Saddle Tank Type Locomotive.
PORTER 42 ton 4 Wheel Saddle Tank Type Locomotive.
WESTERN 12 Yard Air Operated Dump Cars (10).
LEROI 160 cu. ft. Portable Air Compressor on 4 Steel Wheels.
OHIO Model CD 20 ton Locomotive Crane; 40 ft. Boom.
6 WESTERN 5 ft. Fresnos.

Write for Complete List

SOUTHERN IRON & EQUIPMENT COMPANY
Plant & General Offices
Atlanta, Georgia

NEW WIRE ROPE FOR SALE AT BELOW MARKET PRICES

ALL SIZES from 9/16" dia. to 2¼" dia. inclusive.
SUITABLE FOR HOISTING, DRAGLINE, GUY LINES, ETC.

TERRENCE P. WYNN
55 West 42nd St. New York City

BARGAIN OFFERINGS

1—6½ yd. Bucyrus 320-B Electric Shovel.
4—1000 GPM 350' H Electric Pumps.
3—Electric and Steam Mine Hoists.
7—Steam and Electric Air Compressors.
90—Dump Cars 5, 12 and 20-yd. 36" and std. ga.
10—Locomotives, Steam & Gasoline, 36" and std. ga.

IRON & STEEL PRODUCTS, Inc.
Chicago (Hegewisch Sta.), Ill.
"Anything containing IRON or STEEL"

SPECIAL OFFERINGS

All sizes Jaw, Gyratory, Roll and Disc Crushers.
6, 8, 10 & 12" Sand and Gravel Pumps.
360 HP Fairbanks Morse VA Full Diesel Engine.
¾ yd. Koehring Gas Cat. High Lift Shovel.
1 yd. Northwest 105 Gas Cat. Crane 40' boom.
1½ yd. Page Dragline Bucket. Bargain.
8—Leahy 4x6' sgl. deck Vibrating Screens—others.
Let us have your inquiries—Ask for Bulletin No. 42.

MID-CONTINENT EQUIPMENT CO.
710 Eastgate Pa. 2290 St. Louis, Mo.

FOR ONLY A

One Dollar Bill

You Get 12 Big Issues of Pit and Quarry with

1. All the News of the Industry
2. The Best Editorial Features Available

• • •

PAY NO MORE

Send that Dollar Now!

"E. C. A. Rebuilt" Quarry and Gravel Plant Equipment

AIR COMPRESSORS

Portable and stationary, belt with elec. or gas power, sizes from 21 cu. ft. to 1,000 cu. ft.

BINS

2—3-compartment with scales, 10,000 lbs. cap.; 1—50 ton Blaw Knox; 1—112 ton Butler.
9—2-compartment: 1—118 ton Blaw Knox; 1—117 ton Blaw Knox; 1—72 ton Blaw Knox; 1—69 ton Johnson; 1—60 ton Butler; 2—35 ton Blaw Knox; 1—26 ton Heltzel. With or without weigh batchers.
1—1,200 bbl. Blaw Knox round bulk cement bin with 2,000 lbs. weigh batcher.
1—275 bbl. Johnson port. bulk cement plant with 1,000 lbs. weigh batcher, bucket elevator and car unloader.

BUCKETS

1—4 yd. class G Hayward clamshell.
35—Williams, Blaw Knox & Owen clamshell—all sizes and types.
4—Page dragline: 2—1½ yd.; 1—1¼ yd.; 1—1 yd.
3—Dragscraper: 1—1 yd. Green; 1—¾ yd. Sauerman; 1—½ yd. Green.

CRANES, DRAGLINES & SHOVELS

1—Link Belt K-55 ser. No. 1698, 70′ boom, 2 yd. bucket; also have 2 yd. shovel attachment.
2—Northwest mod. 104, ser. Nos. 2079 & 1597, 45′ boom, 1¼ yd. bucket; one with 1 yd. shovel attachment.
1—Link Belt K-42, ser. No. 1265, 45′ boom, 1¼ yd. bucket; also have 1 yd. trench hoe attachment or 1¼ yd. shovel front.
2—Northwest mod. 105, ser. Nos. 2053 & 1522, 40′ boom, 1 yd. bucket.
1—Link Belt K-1, ser. No. 1024, 50′ boom 1 yd. bucket.
1—Osgood Heavy Duty, ser. No. 2069, 40′ boom, 1 yd. bucket & with 1 yd. shovel attachment.
1—Bucyrus Erie, Model 1030, Ser. No. 10512, comb. crane with 40′ boom, and ¾ yd. shovel front.
1—Northwest mod. 2, ser. No. 4797, 40′ boom, ½ yd. bucket.
1—Universal mod. 35, ser. No. 1200, 56′ boom, ½ yd. bucket.
1—Brownhoist No. 1 combination ½ yd. shovel & crane, ser. No. 10057, 30′ boom.
1—Erie type B-2 ser. No. 4122, 1 yd. combination steam shovel & crane, 40′ boom.

CRANES (Locomotive)

1—12 ton Brownhoist gas crane No. 2, ser. No. 8881, 8 wheel, 40′ boom.

CRUSHERS

3—Gyratory: 1—Weston 36B with 50 HP electric motor; 1—No. 3 McCully; 1—No. 0 McCully.
3—Jaw crushers: 1—15″x36″ Cedar Rapids; 1—10″x20″ Climax No. 21½; 1—9″x16″ Telsmith No. 98.
1—Set of Allis Chalmers smooth type crushing rolls, 42″x16″.

ROCK DRILLS

6—Wagon drills, Ing. Rand & Gardner Denver with IRX-71 and Gardner Denver 17 & 21 drills.
67—Jackhammer drills, I.R. DCR-23 & S-49 and Gardner Denver mod. 37 & 11-D.
21—Column & tripod drills: I.R. mods. X71 & JC-11; G.D. mod. 17.

DERRICKS

4—Steel stiff leg: 1—15 ton Clyde, 50′ boom; 1—15 ton Clyde "A" frame barge derrick, 50′ boom; 1—10 ton Insley, 80′ boom; 1—5 ton Insley, 80′ boom.
6—Steel guy derricks: 1—15 ton Terry, 115′ mast, 100′ boom; 1—10 ton American, 115′ mast, 100′ boom; 3—6 ton Bedford, 90′ mast, 80′ boom; 1—5 ton Dobbie, 70′ mast, 58′ boom.

WHIRLEY

1—Mod. 75 Wiley Whirley No. 2973, 20 tons cap., 75′ boom, SD Clyde 80 HP elec. hoist & 30 HP elec. swinger, all complete. Perfect condition.

Send for Complete New Stock List

EQUIPMENT CORPORATION OF AMERICA

PHILADELPHIA
P. O. BOX 5471, KINGESSING STA.
PHONE GRANITE 7600

CHICAGO
1160 S. WASHTENAW AVE.
PHONE NEVADA 2400

PITTSBURGH
P. O. BOX 933
PHONE FEDERAL 2000

LOCOMOTIVES

85 ton Porter 6-wheel switcher with separate tender, 22x26″ cylinders, superheated, A.S.M.E. boiler.

75 ton Baldwin 6-wheel switcher with separate tender, 21x26″ cylinders, A.S.M.E. boiler.

55 ton Baldwin 6-wheel switcher with separate tender, 18x24″ cylinders, A.S.M.E. boiler.

50 ton Baldwin 6-wheel switcher with separate tender, 17x24″ cylinders, A.S.M.E. boiler.

65 ton Porter 6-wheel saddle tank, 18x24″ cylinders, A.S.M.E. boiler.

40 ton American 4-wheel saddle tank, 14x22″ cylinders, A.S.M.E. boiler.

36 ton Porter 4-wheel saddle tank, 14x20″ cylinders, A.S.M.E. boiler.

Complete stock list on request.

BIRMINGHAM RAIL & LOCOMOTIVE COMPANY
Birmingham Alabama

SPECIAL!

25—STEEL 50-TON HOPPER CARS

25—40 ton steel u/f flats.
20—50 ton steel u/f flats.
50—30 ton steel u/f flats.
200—30 ton steel u/f box cars.
75—30 ton steel u/f stock cars.

Narrow Gauge Dump Cars and Locomotives
Standard Gauge Dump Cars and Switch Engines

RELAYING RAILS
Complete Stocks Carried at Principal Points Throughout the Country

HYMAN - MICHAELS COMPANY
122 So. Michigan Ave. CHICAGO, ILL.
St. Louis - New York - San Francisco - Seattle

FOR SALE

8—Jeffrey Muck Loading Machines. Capacity 100 cu. yds. per hour, Motor Driven—Length 78 Feet.
28—50 Cu. Ft. Koppel Cars, side dump, 24″ Gauge, 14″ Roller bearing wheels.
41—4 Yd. Koppel Contractors, Dump Cars 36″ Gauge.
4—6 Ton Goodman Locomotives, Combination Trolley and Battery.
1—66″ x 84″ Allis-Chalmers Jaw Crusher complete with Motor and Drive.

All in Excellent Condition

Box 1005
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

Atlantic Bargains

CRANES and SHOVELS

2—BUCYRUS ERIE DIESEL SHOVELS. Model 43B, 2 yd. capacity, 55′ or 70′ Crane Boom
1—LINK BELT DRAGLINE GASOLINE, Model K-55, 2 yd. capacity, 85′ Boom
1—KOEHRING MODEL 702 DRAGLINE, Gasoline 70′ Boom
1—KOEHRING SHOVEL, Model 501, Gasoline, 1¼ yd. capacity, 50′ Crane Boom
1—INDUSTRIAL BROWNHOIST CRANE, Gasoline 50′ Crane Boom, Capacity 15-tons
1—BYERS BULLDOG SHOVEL, Gasoline, ½ yd. capacity, 40′ Crane Boom
1—UNIVERSAL TRUCK CRANE, Gas., 28′ Boom

DERRICKS

1—TERRY STEEL STIFF LEG, 87′ Boom, Capacity 60 tons at 40′
1—AMERICAN TERRY STEEL STIFF LEG, 100′ Boom, 10 ton Capacity
6—AMERICAN STEEL GUY DERRICKS, 100′ Booms, 15 ton Capacity

COMPRESSORS

1—INGERSOLL RAND Truck Mounted, 2 stage, 105 cu. ft. Capacity, Gasoline
1—INGERSOLL RAND Portable, 2 stage, 210 cu. ft. Capacity, Gasoline
1—INGERSOLL RAND Portable, 2 stage, 315 cu. ft. Capacity, Gasoline
Also 1 R Belt Driven Stationary Machines from 400 to 1200 cu. ft. capacity

PILE HAMMERS

1—VULCAN No. 1
1—VULCAN No. 2
1—McKIERNAN TERRY No. 7
1—McKIERNAN TERRY No. 9B3

HOISTING ENGINES

12—ELECTRIC & GASOLINE SINGLE, DOUBLE & TRIPLE DRUM, RANGING FROM 20 TO 200 HP.

ATLANTIC
EQUIPMENT CORP.

50th & Grays Ave. PHILADELPHIA, PA.
Tel. Evergreen 6363

FOR SALE

Locomotive—American, 40 Ton, Standard Gauge, 4 Wheel, Saddle Tank, Nat. Board Boiler, Overhauled, First Class Condition.

Locomotive — Vulcan 32 ton standard gauge, 4 wheel saddle tank, 190 lb. Code boiler.

Crane—Industrial 25 ton capacity, type H, 8 wheel, steam, Code boiler, cheap.

Bucyrus—Caterpillar Mounting for Railroad Type Shovel.

Marion—Model 61 Steam Shovel Boom.

Bucket—Hayward 1 cu. yd. capacity, Class E Ore Bowl, Manganese Lips, Overhauled First Class Condition.

Mixer—Smith model 56 S Concrete mixer, 2 cu. yd. capacity, this machine never mixed concrete and is like new, priced very reasonable.

E. E. FORT
1119 S. 56th St. PHILADELPHIA, PA.

Motors & Generators

Save by buying guaranteed rebuilt equipment from our large stock.

SLIP RING MOTORS

H.P.	Speed	Make	Type
300	514	G. E.	IM-17A
400	600	G. E.	IM
400	514	G. E.	MT-410Y
500	600	West.	CW
500	450	G. E.	MT-412
600	514	West.	CW
700	400	G. E.	MT-432

SYNCHRONOUS MOTORS

75	1800	G. E.	TS
100	720	G. E.	TS
125	900	G. E.	TS
300	720	G. E.	ATI
300	600	G. E.	ATI

MOTOR GENERATOR SETS

1—150KW, 250/275 Volt G.E. Synchronous
1—200KW, 250/275 Volt G.E. Synchronous

Write for a copy of our 24-page Stock List.
Your inquiry will be answered promptly.

Electric Generator & Motor Co.
4519 Hamilton Ave. Cleveland, Ohio
Established 1900

FOR SALE

1 Vulcan Direct Heat Dryer, 3′x30′.
4 Stearns Rogers Tube Mills 5′x22′, Silex lined.
1 Gates Tube Mill 5x21, Silex lined.
1 Bonnott Tube Mill 5′x18′, Silex lined.
1 Dorr Classifier, 12 ft. inside diameter bowl.
2 H. T. boilers, size 72x20.
3 H. T. boilers, size 72x18.
1 Marine boiler, 250 H.P.
5 Steel smoke stacks, 36″x60′—10 gauge.
1 Chuse Engine 11x12, single valve.
1 Hoisting engine.
1 Steam traction engine, Double cylinder.
1 No. 0 Raymond Pulverizer.
1 Crane Gate Valve 10″.
1 Multi-Foote, ½ yd. concrete mixer—Caterpillar tractor.
1 Well drill, gasoline tractor.
1 Osgood ⅞ yd. steam shovel.
1 Webb City Jaw Crusher, 18x10.
1 Shaker Screen 8x2.
1 Burr Mill, 36″, ball bearing.

WANTED TO BUY

1 Indirect Heat Dryer, 7 T. per hr. capacity.
1 Rotary Steam Dryer, 6x35-40.

Illinois Minerals Company
Cairo, Illinois

FOR SALE—A Good Time to Buy

Sand Lime Brick Plant complete. New.
2 Turbo Generators 750 KW, 600 V. with condensers.
1 March Ball Mill 10'x9' with 600 H.P. A.C. motor.
1 P & H 900 diesel cat. shovel, 3½ yd.
1 Traylor 60x84 heavy duty jaw crusher.
1 Hardinge pebble mill 8'x22", white lining.
1 set rolls 16x42 — 1 pulver. No. 4 — 1 jaw crusher 23x36.
1 diesel electric dragline cl. 24 Bucyrus. 5 yd.

A. V. KONSBERG, 111 W. Jackson Blvd., Chicago

RELAYING RAILS

All sections new and relaying rail, spikes, bolts frogs, switches, "V" Shaped, flat and Con tractors' Cars, etc. Prices cheerfully quoted

M. K. FRANK

480 Lexington Ave., NEW YORK CITY
25 St. Nicholas Bldg., PITTSBURGH, PENNA.

Practically completed new lime plant located in Oklahoma, with plenty of high quality stone, railway facilities, electricity, water and near abundant supply of two kinds of fuel. Due to inability to manage two plants, will sell or will lease to responsible party at a price you cannot afford to overlook. Good demand for lime products in Oklahoma.

DALLAS LIME COMPANY
900 North Lancaster Ave.
Dallas Texas

1—Bucyrus Erie GA-2 1¼ gas air shovel serial 4366, $2750.00. Located our yard, Baltimore.

D. C. ELPHINSTONE, INC.
115 S. Calvert St., Baltimore, Md.

SPECIAL BARGAIN

604 CFM Ingersoll-Rand class POC-2 Diesel Oil Engine driven two stage compressor. Rebuilt equal to new. Very low price for quick sale.

BAY STATE IRON WORKS CORP.
Box No. 4, ERIE, PA.

3—50 HP. electric shaft hoists.
⅝ yd. Byers shovel.
½ yd. Byers comb. shovel-crane.
Owen & Williams ¾ and 1 yd. buckets.
Compressors: 110, 275, 310, 446 CF.
Barnes pumps S.P. 3, 4, 6 gas & elec.
Worthington 3" pump elec. 75 ft. head.

J. T. WALSH
Brisbane Bldg. Buffalo, N. Y.

RAILS "1 Ton or 1000"

NEW RAILS—5000 tons—All Sections—All Sizes.
RELAYING RAILS—25,000 tons—All Sections—All Sizes, practically as good as New.
ACCESSORIES—Every Track Accessory carried in stock—Angle and Splice Bars, Bolts, Nuts, Frogs, Switches, Tie Plates.

Buy from One Source—Save Time and Money.
'Phone, Write or Wire.

L. B. FOSTER COMPANY, Inc.
PITTSBURGH NEW YORK CHICAGO

UNUSUAL BARGAINS

K-55 LINK-BELT Crane, 70' Boom, Rebuilt thoroughly.
⅝ yd. KOEHRING Crane—shipped from factory October, 1936. Practically new.
Concrete Mixers. Pumps for almost every duty.
I. R. Portable Air Compressors—almost every size.
Many other items for the contractor.

HOWARD W. READ CORPORATION
800 N. Delaware Avenue
Philadelphia, Pennsylvania

100000 ITEMS

- Motors
- Generators
- Transformers
- M G Sets

Wire—Write—Phone

ERIE ELECTRIC MOTOR REPAIR CO., INC.
124 Church St. Buffalo, N. Y.

36" Belt Conveyor

56—Robins Troughing Idlers.
35—Robins Return Idlers.
325 ft. of Conveyor Belt, 36".
Sell reasonable.

Also BUCKET ELEVATOR BELTS FOR SALE.

TERRENCE P. WYNN
55 West 42nd St. New York City

ELECTRICAL MACHINERY

Motors and Generators, A.C. and D.C. for sale at attractive prices. New and Rebuilt. All fully guaranteed. Write for List and Prices.

V. M. NUSSBAUM & CO.
FORT WAYNE, IND.

FOR SALE

Sand pit passing Massachusetts State specifications without washing. Also complete concrete products plant. Owner retiring.

DUNKLEE SAND AND CONCRETE PRODUCTS CO.
Greenfield, Massachusetts

Sullivan 315 ft. compressor.
Bucyrus-Erie 4½ yd. scraper, demonstrator.
40' boom for Lorain crane.
Several 40-50 H.P. tractors, good for belt power.
Rebuilt Caterpillar 30's, $350 up.
Koehring No. 601 Diesel dragline.

TRACTOR & EQUIPMENT CO.
433 S. Jefferson St. Chicago
Branch at Springfield, Ill.

FOR SALE

4-ton Vulcan gasoline locomotive, 24" gauge. Very reasonable.

A. COURCHESNE, Inc.
El Paso, Texas

PLANT FOR SALE

At Millville, New Jersey. Has been in operation over twenty years. Produces Sand and Gravel for Industrial uses as well as for Construction purposes

MENANTICO SAND & GRAVEL CO.
MILLVILLE NEW JERSEY

FOR SALE

Complete Sand and Gravel Plant Equipment. Electrically operated plant of 200 yds. per day capacity of washed material. Only pit located in the city of Madison, Wis. Extremely low price if purchased before Jan. 1, 1939. For further information on equipment, property lease, etc., write to Box 1100

PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

ELECTRICAL EQUIPMENT FOR SALE

MOTORS — GENERATORS — TRANSFORMERS

Wire or Write for Our Prices Before You Buy.
We will buy your Surplus Electrical Equipment.
What have you for sale?

STEPHEN HALL & CO., Inc.
456 Seventh St. Hoboken, N. J.

SAVE

Bolted type steel bins will cost you less erected than ordinary wood bins.

New and Used Pipe and Tubing

Jos. Greenspon's Son Pipe Corp.
Natl. Stock Yds. (St. Clair Co.) Ill.

REBUILT ELECTRIC MOTORS

Over 10,000 items in stock for immediate delivery—Rochester, N. Y., or Toledo, Ohio, shipment. Rebuilt equipment sold with standard new guarantee. We buy used equipment—25 and 60 cycle—send us your offerings.

BERGER BROS. ELECTRIC MOTORS, INC.
1246 UNIVERSITY AVE., ROCHESTER, N. Y.
Phone Monroe 2094

POSITION WANTED

As supt. of sand & gravel or crushed rock operation. Have had 19 years of continuous service—the last 10 years as supt. of operations and plant construction. Am 38 years of age. Best of references.

Address replies to
Box 1000
PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

Royal E. Burnham

Attorney at Law

•

Patent and Trade-Mark Causes

•

511 Eleventh Street, N. W.
WASHINGTON, D. C.

WE LOOK INTO THE EARTH

By using Diamond Core Drills We drill for Limestone, Gypsum, Talc, Fire Clay, Coal, and all other minerals.

PENNSYLVANIA DRILLING CO
Drilling Contractors
Pittsburgh, Pa.

O. C. HOFFMAN, Pres. L. H. HOFFMAN, Treas.

DIAMOND CORE DRILLING
HOFFMAN BROS. DRILLING COMPANY
PUNXSUTAWNEY, PA.

We drill for any mineral. We have more than forty steam, electric and gasoline drills, adapted for any job. Satisfactory cores guaranteed. Our prices are right.
Established 1902 - - - - - Telephone No. 382

WANTED

One (1) 60 HP fire box boiler, large flues. Must stand inspection. Give description and cash price wanted.

THE BEDFORD-NUGENT CO., Inc.
624 NW Riverside Drive
Evansville Indiana

WANTED

1 Good used 36 in. x 12 ft. or 14 ft. Double Deck Symons Flat Screen.

BLOSSER STONE CO.
Paulding Ohio

WANTED

Troughing and return idlers, 3-roll, roller bearing, for 30" belt.
1—4' x 12' or 5' x 10', single deck, vibrating screen.

State price, condition, make, and location.

TERRE HAUTE GRAVEL COMPANY
Terre Haute, Indiana

WANTED

To lease with option to purchase portable stone crushing plant in good condition. Send replies to Box 1105.

PIT AND QUARRY PUBLICATIONS
538 S. Clark St. Chicago, Ill.

Advertise
Your "Wants"
and
Surplus
Equipment

FOR SALE

Limestone Crushing Plant on improved road, near city of sixty thousand people. 35 acres of good land with from 3′ to 5′ of stripping required, to uncover stone. 30′ quarry face with smooth bottom. Stone is in 2″ to 10″ layers, making it valuable for riprap and building purposes—practically dry, only a few hours pumping per week required. Plant operates from 125 H. P. Buckeye Diesel Engine, the oil for which is obtained from a nearby oil well. This means very low power cost. Buildings and bins of permanent construction, in good condition. Plant has one #5, one #2 and one #3 crusher, Osgood ¾ yard shovel, electric pumps, drills and trucks, in good and serviceable condition. Now in operation and may be inspected at any time. For details, write or wire, Neon Products, Inc., Lima, Ohio.

BULK CEMENT & STORAGE PLANTS

250 bbls. Blaw Knox cement bin, elevator, screw conveyor, weigh batchers, etc., complete plant.
155 bbls. Fuller cement bin, electric weigh batchers.
110 tons Blaw Knox, steel, 2 compts., weigh batchers.

CRUSHERS—JAW—CONE—GYRATORY

Jaw—6x12, 9x16, 10x20, 12x26, 13x30, 18x36, 24x36, 42x60.
Cone—24, 36, 48.
Gyratory—Gates K, Nos. 4, 5, 6, 7½D, Kennedy, Van Saun, Nos. 30, 37, 37S, 49, McCully Nos. 5, 6, McCully Superior 8″.

CRANES—SHOVELS

Northwest Model No. 4, comb. crane & shovel, 1 yd.
Northwest Model No. 3, comb. shovel & backhoe, ¾ yd.
Lima Model No. 101, crane, 50′ boom.
Lorain Model 75B, shovel, 1½ yd.

CLAM SHELL—ORANGE PEEL BUCKETS

2—Williams Favorite, ¾ yd., digging clamshell.
1—Moore Trench, ¾ yd., digging clamshell.
1—Williams Hercules 1½ yd. digging clamshell. NEW.
1—Hayward 1 yd. orange peel.
1—Hayward ¾ yd. orange peel.

CONVEYOR EQUIPMENT

Barber Greene portable conveyors, 24″, steel frames.
Electric drive, 35′ to 45′ type N.
Belt conveyors, complete, steel frames, belt and motors, 24″, lengths, 45′ to 200′.
Conveyor belt, 18″, 20″, 24″, 36″.
Bucket Elevator, 8″x6″x12″, centers 32 Ft.
Head & Tail pulleys, take-ups, rollers, idlers.

MISCELLANEOUS

Fuller Kinyon Type B, portable cement loader.
Fuller Kinyon rotary air compressor.
Dredge pumps, 6″, 8″, 10″, 12″, 16″.
Gas locomotives, 21½ to 35 tons.
V type, side dump steel cars, 2 & 3 yds., 36″ ga.
2—Sauerman Crescent ¾ yd. dragline buckets.
Sauerman double drum, gas, dragline hoist, 65 h.p.
Steel stone skips, 1½, 2, 4 yds.
Air compressors, 220, 310, 450, 523, 750, 1000, 1300 ft.
Derrick, Clyde steel stiff leg, 80′ boom, 10 tons.
Clyde steam hoist, 9x10, three drum, code boiler.
Clyde 3 drum & attached swinger, electric hoist, 75 hp.

RICHARD P. WALSH CO.
30 Church Street, New York, N. Y.

BARGAINS

1 15-ton American Locomotive Crane, A.S.M.E. Boiler.

1 310 cu. ft. Sullivan Air Compressor, Model WK-314. On steel wheels.

1 C.P. No. 100 Wagon Drill.

1 New Holland No. 641-E Rock Crusher.

1 Bucyrus Erie "B" ¾ yd. Steam Shovel.

1 4 to 6 cu. yd. B.-Knox Truck Mixer or Agitator.

4 I.R.-"E.W." Air Trigger Hoists, 8″ niggerhead.

1 O.K. 15 H.P. Double Drum Gasoline Hoist.

RENTAL SERVICE CO., INC.
Venango at 20th St. Sag. 2700 Phila., Pa.

STANHOPE OFFERS!

AIR COMPRESSORS

BELTED: 355, 528, 676, 1000, 1300 & 1570 Ft.
ELECTRIC: 478, 676, 807, 1302 & 1722 Ft.
DIESEL: 603, 807 & 1000 Ft.
PORTABLE GAS: 110, 160, 220, 310 & 540 Ft.
STEAM: 49, 310, 528 & 1300 Ft.

CLAMSHELL BUCKETS

2 Yd. OWEN Type S Material Handling
1½ Yd., 1 Yd. & ¾ Yd. HAYWARD Class E

CRANES & DRAGLINES

12 Ton NORTHWEST 50 Ft. Boom Gas
12 Ton KOEHRING 45 Ft. Boom Gas
25 Ton BROWNING & 30 Ton AMERICAN Locomotive Type
25 Ton LINK BELT K-48 Electric, 70 Ft. Boom

CATERPILLAR SHOVELS

¾ Yd. BYERS Electric
¾ Yd. KOEHRING Gasoline
¾ Yd. 1¼ Yd. & 2 Yd. MARION Electrics
1 Yd. NORTHWEST Gas
1½ Yd. BUCYRUS 41B Steamer

DUMP CARS

46—KOPPEL 1½ Yd. 24 & 30 In. Ga., V Shaped
15—2 Yd., 3 Yd., 4 Yd. 36 In. Ga.
20—Std. Ga. 12 Yd., 16 Yd. & 20 Yd. Cap.

BALL, ROD AND TUBE MILLS

5′x22″ HARDINGE CONICAL Dry Ball Mill
3′x36″ HARDINGE CONICAL Wet Ball Mill
3′x8″ HARDINGE CONICAL Dry Ball Mill
6 x22″ HARDINGE CONICAL Pebble Mill
8′x22″ HARDINGE CONICAL Ball or Pebble Mill
4x8, 8x6, & 10x9 Straight Ball Mills
4x16, 5x18, & 5x22 Tube Mills
31½x8 & 5x7 Air Swept Tube Mills
2x4½, 3x10 & 5x12 ROD MILLS

PULVERIZERS

RAYMOND Auto. Pulverizer No. 0000, 0 & 3
RAYMOND Imp Mills No. 4, 32 & 55
GRUENDLER XXB Mill & Jay Bee No. 3 & 4
RAYMOND 4 & 5 ROLL MILLS

SEPARATORS AND COLLECTORS

Gayco 5 ft. and 12 ft. Separators
Type 360 Sly 8x24, 8x52 and 16x42 Dust Collectors

ROLL CRUSHERS

36x60 Fairmount
24x12 Power & Mng. Smooth Roll

JAW CRUSHERS

10x8, 13x7½, 14x7, 15x9, 15x10, 16x9, 16x12, 16x10, 18x11, 20x8, 20x6, 20x10, 20x12, 20x11, 26x12, 30x15, 30x13, 36x30, 36x18, 36x14, 36x9, 36x6, 38x18, 36x10, 36x24, 42x9, 48x36, 60x42, 84x66, 36x16, 9x36
12x26 Champion, Screen & Elevator

CONE & GYRATORY CRUSHERS

18 in., 24 in., 30 in., 36 in. and 48 in. Symons Disc.
4—10 TZ Traylor 4 ft. Gyratory
4—Nos. 5, 3 & 6 Austin Gyratory
2—Traylor T-12 Bulldog Gyratory
8 in. Traylor T. Gyratory
17 Gates K—Nos. 3, 4, 5, 6, 7½, 8 & 9½
10 Inch Austin Model 105
10 & 13 Inch Superior McCullus
KENNEDY: Nos. 19, 27, 39 & 49
Telsmith No. 9

HOISTING ENGINES

7 Gasoline 15, 40, 60 & 100 H.P.
17 Steam 7x10, 8½x10 and 10x12
8 Electric 20, 35, 50, 60 & 100 H.P.

DRILLS

4—SANDERSONS 14 & LOOMIS 44
7—Ingersoll-Rand Wagon Drills

CEMENT BIN

400 BBl. Portable BUTLER Bulk Cement Bin with Fuller Full Automatic Electric Push Button Weigh Batcher

BUCKET ELEVATORS

7 Steel Encased Chain & Belt Elevators:
15 In. by 60 ft., 24 In. by 63 ft., 18 In. by 48 ft., 12 In. by 30 ft.
ELEVATOR BELT: 600 Ft., 30 In.—1326 Ft. 20 In. & 18 In.

CONVEYOR PARTS

BELT: 1000 Ft. 60 In., 700 Ft. 42 In., 600 Ft. 36 In., 800 Ft. 30 In., 1642 Ft. 24 In., 517 Ft. 20 In., 297 Ft. 18 In., 1000 Ft. 14 In. & 16 In.
IDLERS: 36 In., 30 In., 24 In., 20 In., 18 In.
Head & Tail—Pulleys—Takeup for all sizes
Steel Frames: 2,000 ft. 24 In., 30 In. & 36 In. Sections

ROTARY DRYERS AND KILNS

36 In. x 20 Ft., 3 Ft. x 30 Ft., 4 Ft. x 30 Ft., 54 In. x 30 Ft., 42 In. x 24 Ft., 5 Ft. x 30 Ft., 5 ft. x 16 Ft., 5 Ft. x 60 Ft., 6 Ft. x 60 Ft., 6 Ft. x 70 Ft., 70 In. x 40 Ft.

STEEL DERRICKS

GUY: 8 Ton 85 Ft. Boom, 15 Ton 100 Ft. Boom, 20 Ton 115 Ft. Boom, 50 Ton 100 Ft. Boom
STIFF LEG: 5 Ton 70 Ft. Boom, 15 Ton 100 Ft. Boom

LOCOMOTIVES

GASOLINE: 3 Ton, 5 Ton, 8 Ton, 12 Ton, 14 Ton
STEAM: 9 Ton, 20 Ton, 40 Ton, 60 Ton
ELECTRIC: 2 Ton, 5 Ton, 8 Ton, 40 Ton

SCREENS

VIBRATING: 2x4, 3x6, 2x8, 3x8, 3x5, 4x5, 4x8, 4x10, 48x72
HUMMER, ROTEX, NIAGARA & ROBINS
REVOLVING: 3x12, 3x16, 31½x18, 3x24, 4x16, 4x20, 4x23, 4x24, 5x30, 5x20, 6x20

STEEL BINS

72 Ton BLAW-KNOX 2 Compt.
100 Ton BLAW-KNOX 2 Compt.

SAND WASHERS AND CLASSIFIERS

4 LINK-BELT A-60 In. Classifiers.
7 ALLEN Cones 4 Ft., 5 Ft., 6 Ft., 8 Ft. TELSMITH 13 Ft. by 2 Ft. 8 In. Screw Washer.

RAILROAD CARS

12—50 Ton Cap. Battleship Gondolas.
7—50 Ton Cap. Flat Cars.

SAUERMAN DRAG AND SLACKLINES

1— ¾ yd. Gas.
1—1 yd. Electric.
1—1½ yd. Electric.

HAMMER MILLS

Pennsylvania Trojan M-1.
4 Jeffreys: 24x18-A, 36x24-B, 42x36-E & 42x48-B.
Williams No. 1 Jumbo Jr., & No. 6 Universal.
Gruendler No. 6 X.
Dixie Mogul No. 5040.

R. C. STANHOPE, INC.

(Cable Address: "STANEQUIP" New York)
101 WEST 31ST STREET, NEW YORK, N. Y.
Pennsylvania 6-3565, 6-3566, 6-3596

CONSOLIDATED
GOOD USED EQUIPMENT

Selected Specials

JAW CRUSHERS:
10x15, 13x30, 15x30, 24x36 Farrel; 18x30, 24x36 Allis Chalmers; 30x60, 36x42 Traylor.

CRUSHING ROLLS:
1—42″x16″ "B" Allis Chalmers, used one month; 24x14 A-C; 36x16″, 20x14″ Sturtevant; 30x10″ Traylor. 24x20, 18x16 single roll crushers.

PULVERIZERS:
Raymond 4 and 5 roll high and low side, also two No. 60 Imp. and rigid beater types; 24″ Mikro; and other types.

AIR CLASSIFIERS:
10′ Sturtevant; 5′, 8′, 12′, Gayco.

BALL, ROD AND TUBE MILLS:
No. 32 Marcy, 6′x22″ Hardinge, 3x12′ Hendy, 5x22′ Gates, all iron lined; 5x10′ Marcy, 6′x12′ Hardinge Rod Mills.

HAMMER MILLS:
36x36″ Gruendler with roller bearings, all new mang. parts; 36x24 Gruendler; 24x20, 24x12 Jeffrey; larger and smaller sizes.

ROTARY KILNS AND DRYERS:
1—6′x60′, ¾″ shell, silent chain drive and motor. Will be sold with or without motor driven Detroit Underfeed Stokers. 1—9′6″x150′ Rotary Kiln—also smaller sizes. 12—Rotary Dryers: 3x30, 4x30, 5x30, 5x60, 6x40, 6x60, 8x60, 9x85′.

Send for Illustrated Circulars

CONSOLIDATED PRODUCTS COMPANY, INC.
17-19 Park Row New York, N. Y.
Plant and Shops at Newark, N. J., cover 8 acres of ground.

EQUIPMENT FOR SALE CHEAP

1—Vulcan 40 ton Std. Ga. Saddle tank locomotive.
1—Marion 1 yd. Steam crane 40′ boom on cats.
1—Russell Grader, 10′ Blade.
1—Link-Belt K-30 Trench Hoe, 45′ Boom.
1—Link-Belt K-44 shovel 50′ boom, fairleads.
1—Lorain 75 B 1¼ yd. chain crowd shovel.
2—Whitcomb 12 Ton 36″ Gauge Locomotives.
2—C. P. Compressors, 590 cu. ft., 100 h.p. motor.
2—Worthington Compressors. 621 cu. ft., 75 h.p. mtr.
1—Monarch 75 Caterpillar with bulldozer.
1—Sullivan 310′ portable compressor.
1—Ingersoll-Rand pavement breaker.
6—Easton 4 yd. all steel 36″ Ga. cars.
4000′ of 9″ x 9″ road forms.
1—Ransome 27 E Paver.
2—No. 116 Chicago Pneumatic Paving Breakers.
2—1 yd. Insley bottom dump concrete buckets.
1—Schramm No. 120 Compressor.
1—1 yd. Owen Bucket.
1—1 yd. Kiesler rehandling bucket.
1—¾ yd. Browning clamshell bucket.
1—¾ yd. Blaw-Knox bucket.
1—Le Courtney 6″ Cent. Pump. 40 h.p. motors.
1—Morris 8″ dredge pump, 150 h.p. G.E. motor.
1—Morris 10″ cent. pump, 2250 GPM at 130′ head.
1—Goulds 12″ cent. pump, 50 h.p. G.E. motor.
1—Thompson 6″ self-priming pump, Waukesha motor.
2—Gardner Denver Sheeting Hammers.
2—Humdinger 6″ self-priming pumps, gas motor.
1—Humdinger 4″ self-priming pump.
1—Humdinger 2″ self-priming pump.
1—Domestic double diaphragm pump, gas motor.
1—G.E. motor, 200 h.p. slipring.
2—No. 9 B 2 McKiernan-Terry Hammers.
3—No. 5 McKiernan-Terry Hammers.
3—No. 7 McKiernan-Terry Hammers.

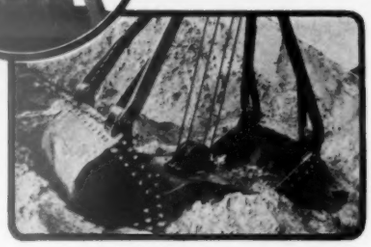
HARRY C. LEWIS
325 Frelinghuysen Avenue Newark, N. J.

FOR SALE

3—5 Ton Plymouth Gas Locomotive 36″ ga. Elect. Light & Start, Buda 35 HP Engine, Late Type.
1—Fuller Kinyon, Portable, Type C, Cement Unloading Pump, Cap. 115 bbls. per hr. Hose, Pipe & Fittings with Rotary Compressor 303 CFM, 40 lbs. pressure.
1—70 HP Cummins Diesel Engine 4 cyl, 4 cycle Solid Injection 685 RPM with starting unit.
1—10 HP Witte Type K Horiz Semi Diesel Engine Friction Clutch Pulley 360 RPM.
1—200 HP Fairbanks-Morse Diesel Engine direct connected 136 KW F-M Generator 3/60/440.

JOHNSON-KERN MACHINERY CO.
5214 LeMoyne St.
Chicago Illinois

"Wear INSURANCE"
is sold with Every Owen Bucket



Efficient operation is of first importance in a bucket, but long service with freedom from repairs is equally essential.

In many important details, Owen design is conducive to this long, satisfactory operation.

Read, in the new catalog about protected sheaves, sealed shaft bearings, one-piece non-wobbling head, non-chafing cables, etc.

THE OWEN BUCKET CO.
6050 Breakwater Ave., Cleveland, Ohio
Branches: New York, Philadelphia, Chicago, Berkeley, Cal.

Index to Advertisers

Allen-Sherman-Hoff Co. Inside Front Cover
*Allis-Chalmers Mfg. Co. 24
*American Cable Division of American Chain & Cable Co. Inside Back Cover
*American Chain & Cable Co. Inside Back Cover
*American Pulverizer Co. 80
Atlantic Equipment Corp. 109
Atlas Powder Co. 8
Audubon Wire Cloth Corp. 106
*Austin-Western Road Machy Co., The 106

Babcock & Wilcox Co., The 4
Bacon, Inc., Earl C. 71
*Baldwin Locomotive Works 101
Barrett-Cravens Co. 93
Bay City Shovels, Inc. 107
*Birdsboro Steel Foundry and Machine Co. 9
Birmingham Rail & Locomotive Co. 109
*Blaw-Knox 96
Broadcast Section 108-112
Broderick & Bascom Rope Co. 105
*Brooks Equip. & Mfg. Co. 2
*Bucyrus-Erie Co. 25
*Bucyrus-Monighan Co. 25
Burnham, Royal E. 110

Carnegie-Illinois Steel Corp. 12
Caterpillar Tractor Co. 17
*Chicago Bridge & Iron Co. 94
Chicago Perforating Co. 74
*Chicago Pneumatic Tool Co. 106
Chicago Steel Fdry. Co. 79
Cleveland Wire Cloth & Mfg. Co. 107
Concrete Industries Exposition 20
Concrete Pipe Machy. Co. 89
*Consolidated Products Co. 111
Continental Roll & Steel Foundry Co. 22
Cummins Engine Co. 27

Davenport Locomotive Works 105
*Deister Concentrator Co. 71
Deister Machine Co. 100
*Dempster Bros. 11
*Dracco Corp. 70
*Dixie Machy. Mfg. Co. 75
Dunn Mfg. Co., W. E. 95

*Eagle Iron Works 97
Electric Generator & Motor Co. 109
*Ensign-Bickford Co. 23
Equipment Corporation of America. 109
Erie Pump & Engine Works 80

Flexible Steel Lacing Co. 97
Fort, E. E. 109
Frog Switch & Mfg. Co. 76
*Fuller Co. 15

Gates Rubber Co., The 7
General Motors Corp. 3
Gilmore Wire Rope Division of the Jones & Laughlin Steel Corp. 18
*Gruendler Crusher & Pulverizer Co. 70

*Haiss Mfg. Co., Geo. 69
Hetherington & Berner, Inc. 112
Hoffman Bros. Drilling Co. 110
Hotel Philadelphian 80

Illinois Minerals Co. 109

Jackson & Church Co. 96
*Jaeger Machine Co. 96
*Jeffrey Mfg. Co. 77

*Kennedy-Van Saun Mfg. & Engr. Corp. 103

Leschen & Sons Rope Co., A. 72
*LeTourneau, Inc., R. G. 16
Lewis, Harry C. 111
Lewistown Foundry & Machine Co. 105
*Link-Belt Co. 1-97
Ludlow-Saylor Wire Co. 105

Manganese Steel Forge Co. 106
McCarter Iron Works, Inc., The 95
McLanahan & Stone Corp. 105
*Merrick Scale Mfg. Co. 107
*Morris Machine Works 107
Multiplex Concrete Machy. Co. 91
Murphy Diesel Co., Ltd. 19

National Concrete Masonry Ass'n. 20
National Crushed Stone Ass'n 20
National Ready-Mixed Concrete Ass'n 20
National Sand & Gravel Ass'n 20
National Supply Co., The 28
National Wire Cloth Co. 107
Naylor Pipe Co. 69
Neon Products, Inc. 111
New Holland Machine Co. 73
*Nordberg Mfg. Co. 14
Northwest Engineering Co. 21

Owen Bucket Co. 112

*Parson Engr. Corp. 78
Pennsylvania Drilling Co. 110
Peerless Pump Division of Food Machy. Corp. 78

Quinn Wire & Iron Works 96

R&L Concrete Machy. Co. 95
*Raymond Pulverizer Div. of Combustion Engr. Co., Inc. 30
*Robins Conveying Belt Co. 32
*Roebling's Sons Co., John A. 13

*Sauerman Bros., Inc. 107
Schaffer Poidometer Co. 71
Screen Equipment Co. 69
Separation Process Co. 5
Simplicity Engr. Co. 107
*Sly Mfg. Co., The W. W. 99
*Smidth & Co., F. L. Back Cover
Smith Engineering Works 6
Smith Co., The T. L. 94
Southern Iron & Equipment Co. 108
*Sprout, Waldron & Co. 80
Stanhope, Inc., R. C. 111
Stearns Mfg. Co. 93
Stulz-Sickles Co. 106
Sturtevant Mill Co. 76
Superior Engine Division of The National Supply Co. 28

Taylor Forge & Pipe Works 73
Timken Roller Bearing Co. 29
*Traylor Engineering & Mfg. Co. 99
*Tyler Co., W. S. 71

United States Steel 12
Universal Concrete Pipe Co. 87
*Universal Crusher Co. 10
Unverzagt, G. A. 108

Walsh Co., R. P. 111
*Warren Bros. Roads Co. 94
Wellman Eng. Co. 103
*Western Precipitation Corp. 100
*Whitcomb Locomotive Co. 101
*Williams Patent Crusher & Pulverizer Co. 105

***See also information in the 1938 Pit and Quarry HANDBOOK**

H&B BITUMINOUS PAVING MACHINERY H&B

Bituminized Material Offers a New Outlet for Your Aggregate

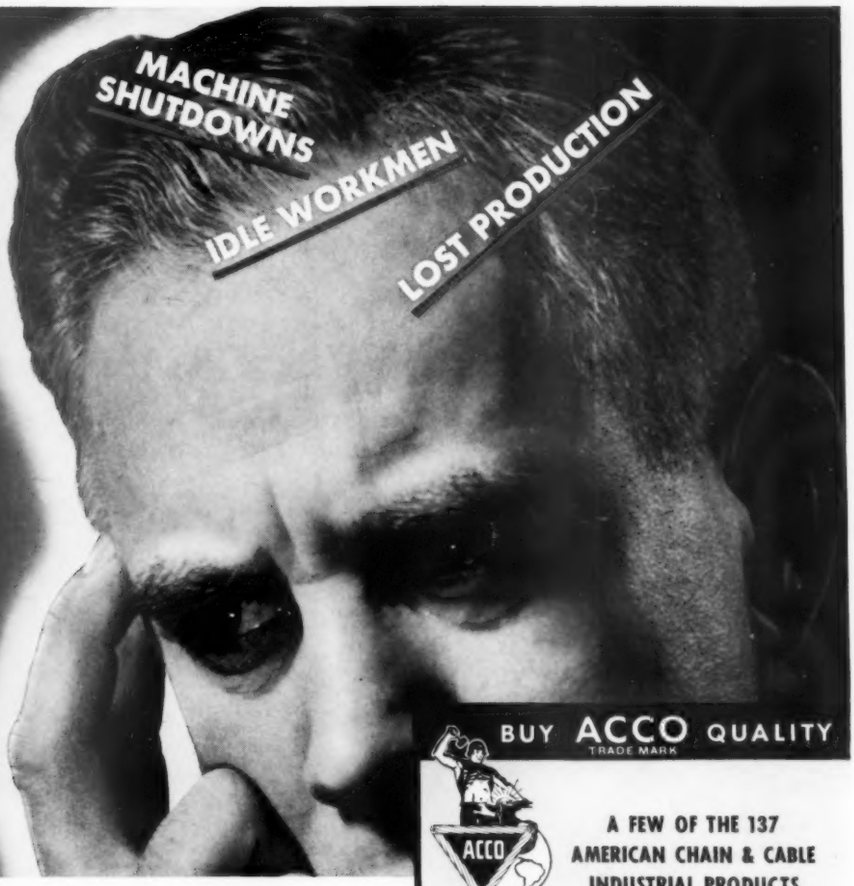
● The H & B tower type plant combines portability and large capacity. Built by manufacturers of asphalt paving machinery for over 30 years.

Send for our new bulletin T-247

HETHERINGTON & BERNER, INC.
ENGINEERS—MANUFACTURERS
INDIANAPOLIS, IND.

TRU-LAY *Preformed*

LESSENS THESE WORRIES



BUY ACCO QUALITY
TRADE MARK

● Rope replacement costs you more than merely the price of the new rope. When a rope fails, production stops. Men and machinery are idle. Time is lost. These are the things that make some ropes really costly.

Of course TRU-LAY Preformed wears out in time but it lessens your worries by lasting longer and *reducing* shutdowns. More than this, TRU-LAY is easier to handle and faster to reeve. It resists kinking or whipping and spools perfectly on the drum.

During the past fourteen years literally thousands of operators have found TRU-LAY Preformed wire rope to be a production booster through its ability to wear longer. Specify TRU-LAY Preformed for your next line.

AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE COMPANY, Inc.
WILKES-BARRE, PENNSYLVANIA
District Offices: Atlanta, Chicago, Detroit, Denver, Los Angeles, New York, Philadelphia, Pittsburgh, Houston, San Francisco.

GREEN SIGNIFIES SAFETY

A FEW OF THE 137 AMERICAN CHAIN & CABLE INDUSTRIAL PRODUCTS

AMERICAN CHAIN DIVISION
(DOMINION CHAIN COMPANY, Ltd., in Canada)
Weed Tire Chains • Welded and Weldless Chain • Malleable Castings
Acco-Morrow Lubricators

AMERICAN CABLE DIVISION
Tru-Lay Preformed Wire Rope • Tru-Loc Processed Fittings • Crescent Brand Wire Rope
Tru-Stop Brakes • Tru-Level Oil Controllers

ANDREW C. CAMPBELL DIVISION
Abrasive Cutting Machines • Floformers
Special Machinery • Nibbling Machines

FORD CHAIN BLOCK DIVISION
Chain Hoists • Trolleys

HIGHLAND IRON & STEEL DIVISION
Wrought Iron Bars and Shapes

MANLEY MANUFACTURING DIVISION
Automotive Service Station Equipment

OWEN SILENT SPRING COMPANY, Inc.
Owen Cushion and Mattress Spring Centers

PAGE STEEL AND WIRE DIVISION
Page Fence • Wire and Rod Products
Traffic Tape • Welding Wire

READING-PRATT & CADY DIVISION
Valves • Electric Steel Fittings

READING STEEL CASTING DIVISION
Electric Steel Castings, Rough or Machined Railroad Specialties

WRIGHT MANUFACTURING DIVISION
Chain Hoists • Electric Hoists and Cranes

In Business for Your Safety

TRU-LAY *Preformed* WIRE ROPE

ALL AMERICAN CABLE DIVISION ROPES MADE OF IMPROVED PLOW STEEL ARE IDENTIFIED BY THE EMERALD STRAND

Argentina
Australia
Belgium
Brazil
British India
Canada
China
Chile
Colombia
Czecho-Slovakia
Denmark
Eire
England
Estonia
Finland
France
French Indo-China
Germany
Hungary
Iran
Italy
Japan
Luxemburg
Morocco
New Zealand
Norway
Poland
Portugal
Roumania
Siam
South Africa
Spain
Sweden
Switzerland
Syria
Tunis
Turkey
U. S. A.
Yugo-Slavia
SMIDTH MACHINERY
FOR
CEMENT • LIME • ORE
The illustrations show some of the installations of Smidth machinery in various countries. Space does not permit showing all. However, Smidth machinery has been supplied to
64 COUNTRIES OF THE WORLD
250
UNAX ROTARY KILNS
have been installed
throughout the world
650
UNIDAN MILLS
have been installed
throughout the world
In addition to rotary kilns and Unidan Mills, Smidth equipment includes a complete line of machinery, such as ball mills, tubemills, coolers, agitators, wash-mills, rotary conveyors, cyclone collectors, etc., with accessories for use in Cement, Lime and Ore plants.
F. L. SMIDTH & CO.
225 BROADWAY Engineers NEW YORK, N. Y.

Slovakia

Indo-China